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WILLIAM BARTON ROGERS,

FOUNDER OF THE MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

In the usual connotation of the title the founder of the Institute of Technology was the Commonwealth itself, for the State's gift of land, together with its allotment of one-third of the so-called Morrill Land Grant to the institution, made tangible the vision of a school of applied science which had long existed in the minds of certain enthusiastic and far-seeing men. This relationship to the State is fitly recognized by the word "Massachusetts" in the name of the Institute, and by the presence of the Governor, the Chief Justice of the Supreme Court, and the Secretary of the Board of Education upon its Corporation.

Gratefully, however, as every Institute man acknowledges the early and continued favor of the Commonwealth, the true founder of the Massachusetts Institute of Technology is, without question, its first President, William Barton Rogers, that eminent geologist who for twenty-five years used the whole force of his broad mind, of his rare foresight, of his signal executive ability, of his unusual eloquence, of his extraordinary powers of persuasion, in planning, establishing and building up the school to which he gave, at last, life itself.

Professor Rogers threw himself into the task of upbuild-

ing the Institute of Technology as few men have devoted themselves to any similar undertaking. He lived for the school alone, and inspired those about him to work with almost equal self-forgetfulness. He was zealous, indefatigable, courageous, enthusiastic, no less intellectually than morally honest. He drew around him a board of trustees having like qualities; together they created a faculty similarly inspired; and by them were sent out, from the beginning, students fired with kindred courage and intellectual integrity. Coincidently with its very founding, therefore, appeared that "Technology Spirit" which, indefinable in words, is to-day recognized as a distinctive attribute of Institute men.

To write of Rogers, then, as its founder is to go to the very source of the Institute's success. He did much other work of importance besides that of establishing the School of Industrial Science, but this was his greatest and most enduring achievement. Therefore, in the eyes of Institute men, he is peculiarly theirs; therefore this memorial of him will lay special stress upon that side of his career. As a consequence, it will present but an imperfect impression of the life of Professor Rogers as a whole. It will dwell upon those phases of his character, thought and acts which bear especially upon the Institute of Technology, passing over entirely or with inadequate notice those many other interests which made him one of the broadest men of his generation. No permanent loss can result from such a partial view, for in the "Life and Letters"** is to be found that well-rounded picture of President Rogers which history demands.

One hundred years ago, on the seventh day of December,

*Edited by Mrs. Rogers with the assistance of Professor Sedgwick. Published by Houghton, Mifflin & Co., 1896. To these two volumes the present memoir is almost wholly indebted for its facts.

1804, William Barton Rogers was born in the city of Philadelphia, at 262 North Second Street. His father, Patrick Kerr Rogers, from the north of Ireland, near Londonderry, was the eldest son of Robert Rogers, a gentleman of some estate, and his wife Sarah (Kerr) Rogers. Patrick Rogers entered a counting-house in Dublin to be trained to a mercantile life, but at the time of the rebellion of 1798 wrote articles hostile to the government, and was forced to flee to America, reaching Philadelphia in August of that year.

Although but twenty-two years of age, and a stranger except for his acquaintance with the many other Irish refugees in that city, he was within a few months appointed a tutor in the University of Pennsylvania. In the following winter he entered the Pennsylvania Hospital as a student and while still there married Hannah Blythe,—also from Londonderry, though of Scotch descent,—who had come with her sisters to Philadelphia in 1794. In February, 1802, their eldest son was born, and in May of that year Mr. Rogers received the degree of Doctor of Medicine from the University of Pennsylvania.

In 1803, Robert Rogers, the father, having died, his son was obliged to return to Ireland to settle the family estate. The property having, however, to be divided among twelve children, Dr. Patrick Rogers inherited only enough to pay off the debts which he had contracted in securing a medical education and in establishing a household. Moreover, his long absence proved disastrous to his professional success; for he had not established, before his departure to Ireland, a medical reputation sufficient to hold his patients. Therefore, to eke out his income, he started, upon his return, a medical library which, for lack of patronage, only added to his financial burdens. Thus weighed down, he deemed it wise to remove to Baltimore and to start afresh.

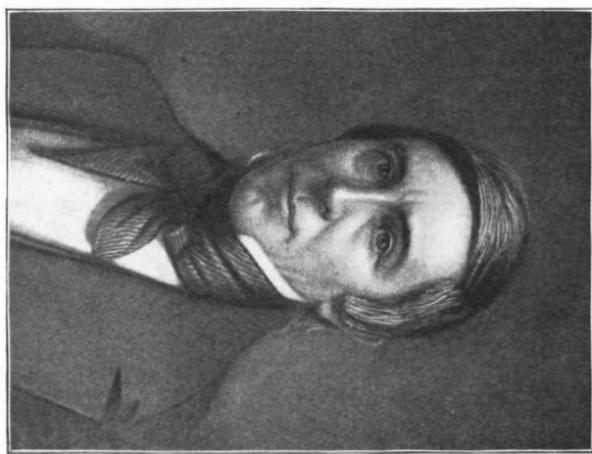
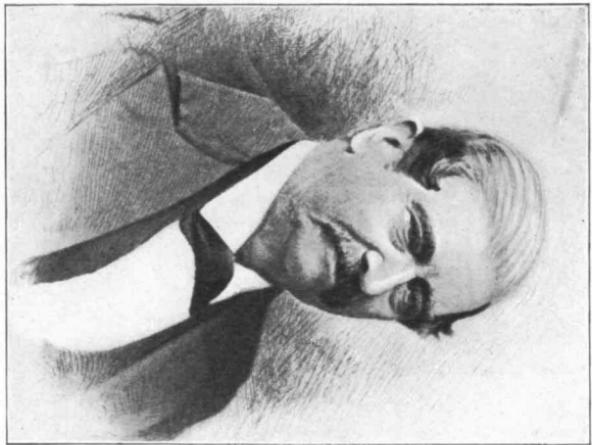
There, for the seven years between 1812 and 1819, he carried on a hard struggle against poverty,—a struggle painfully shared by his family and from which the sons were not to emerge for many years.

While in Philadelphia, Dr. Patrick Rogers had delivered several courses of lectures with much success, and it is clear that he felt himself better fitted, as indeed he was, for teaching than for the work of a practitioner. In 1819 this special aptitude came at last to be recognized, and he was invited to the chair of Natural Philosophy and Chemistry in the College of William and Mary—next to Harvard the oldest in the United States—at Williamsburg, Va. Agreeable as this change was, it proved disastrous to the health of all the family. So malarial was the climate that within one year Mrs. Rogers died, and within nine years Dr. Rogers himself succumbed, despite the fact that, as soon as his teaching duties would permit, the whole family every summer left Williamsburg for a more healthful locality.

Patrick Kerr and Hannah (Blythe) Rogers had seven children, of whom four survived. These four all became eminent as men of science and were known, familiarly, as the "Brothers Rogers." Interesting as it would be to follow the career of each one, it is possible simply to summarize the lives of the eldest and the two youngest, making afterwards only such fragmentary references to them as the close relationship of his brothers to William Barton Rogers may require.

The eldest son, James Blythe, was graduated in medicine, at Baltimore, in 1822, practised his profession in Maryland for a few years, and was then a manufacturing chemist and subsequently a lecturer on chemistry in Baltimore. Thence he went to Cincinnati, where he was for four years Professor of Chemistry in the Cincinnati College

R. Rogers -
Samuel Rogers - Henry Rogers



(assisting, also, his brother William in the geological survey of Virginia). In 1840 he went to Philadelphia, and was Professor of Chemistry there, first in the Philadelphia Medical Institute, then in the Franklin Institute, and finally, till his death in 1852, in the University of Pennsylvania.

The youngest of the four brothers, Robert Empie, was graduated in medicine from the University of Pennsylvania in 1837, and after five years of varied work in geology and medical chemistry was appointed Professor of Chemistry in the University of Virginia. At the death of James Rogers in 1852, Robert was elected his successor in the University of Pennsylvania. This position he filled with such acceptance that, within four years, he was made also Dean of the Faculty. He remained in this double office for twenty-five years until, in May, 1877, he resigned to accept the Professorship of Medical Chemistry and Toxicology in the Jefferson Medical College of Philadelphia, where he continued until his death in 1884.

Of the career of the third brother, Henry Darwin, there can be no better summary than that given in the American Cyclopædia [1864], for it was written by William Rogers himself:—

Henry Darwin Rogers, an American geologist, born in Philadelphia in 1809, became professor of physical sciences in Dickinson College, Carlisle, in 1831, and afterward professor of geology in the University of Pennsylvania, which office he held for many years. He began his active geological labors with the survey of the State of New Jersey, and in 1835 published a report and geological map of the State. He then entered on his great work, the survey of Pennsylvania, in which, with some interruptions, he was occupied until 1856, publishing during the first years annual reports of progress which make together a large 8vo volume. His final report on the geology of Pennsylvania, in two large volumes, 4to,

with numerous drawings and illustrations, and an atlas of geological maps, executed by A. Keith Johnston (Edinburgh, 1858), is recognized as a work of great thoroughness and originality, especially in the departments of structural and dynamic geology, and ranks in scientific as well as practical value with the labors of the first geologists of the age. In 1857 he was appointed regius professor of geology and natural history in the University of Glasgow, Scotland, where he has since lived. For some years previous to this appointment he was a resident of Boston. Professor Rogers has contributed many important papers on geological and other scientific subjects to the "Transactions" of the American Philosophical Society, the Boston Society of Natural History, the American Association of Science, the American *Journal of Science*, and the Edinburgh *New Philosophical Journal*, of which last he is one of the editors. He is the author of a geological map of the United States, and a chart of the arctic regions in the *Physical Atlas*, and, in conjunction with W. and A. K. Johnston of Edinburgh, has published a geographical atlas of the United States.

As will appear, William and Henry were, of the brothers, those most closely associated in scientific work and in planning the Institute of Technology. The extraordinary intimacy and interdependence of these two, however, was only a little closer than that which bound together all four of the brothers Rogers, each to each, in a personal and scientific friendship most notable and beautiful. A warmth of phrase due to their Keltic ancestry and to their Southern residence gives to their familiar letters a tone which to New England ears savors of hyperbole. But there is no touch of insincerity, no suspicion that every word of solicitude in matters of health, or of rejoicing in scientific and professional progress is not as deeply felt as is glowingly expressed. The early years of all of them were filled with hardships and were often made discouraging by the unjust or unappre-

ciative acts of others. Moreover, the fortunes of each brother greatly fluctuated, one meeting with success while another was encountering adversity, one advancing rapidly in public recognition while another, for the time, seemed destined to obscurity. Never, however, into their correspondence, never into their relationship, did there enter a word or thought of envy on the one hand or of exultation on the other. The success of one was the joy of all, the passing failure of another was the sorrow of all. Such harmony, such warmth of affection, such mutual helpfulness as this, could have but one result,—that together they should achieve results in science and reach positions of responsibility and honor which separately they would hardly have been likely to attain. Better than this, their rare concern in one another's affairs gave them a breadth of outlook and a diversity of interests unique in their generation. All of them followers of science, their paths were sufficiently diverse to cover practically the whole scientific field. And, while each perfected himself in his specialty, he followed also with such absorbed interest the work of the others as to attain in all branches of science a marked proficiency. This breadth of view gave them that authority and that power which made them such conspicuous leaders in the scientific development of the United States.

More marked and most fruitful was this closeness of interest, this breadth of knowledge and this harmony of investigation in the case of William and Henry Rogers. Not only did it place them among the great leaders in geology, not only did it secure to them important State offices in scientific work and the friendship of learned men throughout the world, but it led them also to survey the whole field of pure and applied science with such clear and prophetic vision as to enable them to conceive, as early as 1846, a

plan for a polytechnic school which, many years later, was to develop, along those very lines and under the guidance of William, into a school of technology such as we know to-day.

Because of the financial struggles and rather wandering life of Patrick Rogers the education of his four sons, from the ordinary standpoint, was somewhat desultory. William, like his brothers, received his training mainly at the hands of his father. While this education may have lacked conventionality, it evidently was not wanting in those more important features,—inspiration, enthusiasm, and real hunger for knowledge. A genuine teacher himself, Dr. Patrick Rogers fired his sons with a love of learning and imbued them with the power to teach. It was evidently he, too, who bound his sons so closely to him and to one another that the cement of their mutual love never afterwards failed.

William Rogers, especially, early showed unusual ability in teaching as well as rare power of expression. His oratorical gift, indeed, was so marked that in his seventeenth year he was chosen to deliver the oration at the celebration of the third "Virginiad" at Jamestown. From then until his twenty-first year he seems to have devoted himself, partly as a student at William and Mary, but mainly under his father's guidance, to ardent work in mathematics, physics, the classics and modern languages. In 1826, after a year's experience of mercantile pursuits in Baltimore, he opened, together with his brother Henry, a school at Windsor, fourteen miles from that city. This gave him a good experience in teaching and administration, while permitting him also to begin what he above all else enjoyed, the work of public lecturing. During that winter of 1826-27 he delivered, with much success, a course of lectures at the Maryland Institute in Baltimore. The meagre scale then

governing such work is shown in the fact that the school yielded to the brothers a net income of only about five hundred dollars, while William was paid for twenty-five lectures only two hundred dollars more. Although upon "Natural Philosophy," the lectures, furthermore, had to be given without a single piece of apparatus for use in demonstration. That they were largely attended, eagerly followed and enthusiastically commended, is eloquent testimony to Mr. Rogers's power of graphic description.

William Rogers hoped for a permanent position in the Maryland Institute. This wish was not realized; but he was given the management of an "English and Mathematical" School opened the next year in connection with the Institute. This school he carried on successfully until, upon the death of his father, in August, 1828, he was appointed his successor as Professor in Natural Philosophy and Chemistry at William and Mary College. The young man's election to this chair took place Oct. 13, 1828, when he was not yet twenty-four years of age. Two years later, the professorship of mathematics having become vacant, he filled it temporarily, and with such success that the students petitioned the Board of Visitors not to fill the vacancy, but to continue Mr. Rogers in both professorships.

James, the eldest of the brothers, being at this time absent in Baltimore and the victim of peculiarly adverse fortune, the leadership of the family devolved upon William; and this youth writes even to that elder brother with a gravity and sense of responsibility which show how seriously he assumed and how adequately he filled the position. Throughout the remainder of his life this fatherliness of William's was recognized and gladly accepted by the other brothers, and it was around him that the lives of the remarkable fraternal group largely centred.

Meanwhile Henry Rogers, carried away temporarily by the doctrines of Fourier and the teachings of Robert Dale Owen, went to England, that he might associate himself with the labors of the latter. While strongly opposed by his brothers, this step proved in the end a most fortunate one; for, introduced in this way to the society of the brilliant men who had for a time embraced those doctrines, a taste for geology, which had been fostered by a survey made by Henry several years before for the projected railway between Boston and Providence, was developed; and, under the stimulus of those learned Englishmen, it soon overshadowed his interest in socialism. His studies grew broader and his fame grew greater until, in March, 1833, he had earned and was honored with election as a Fellow of the Geological Society. This brought with it the intimacy of that rare group of scientific men which included such names as Faraday, Brewster, De la Beche, Phillips, Murchison, Lyell, Wheatstone, Darwin, and Playfair. With all those pioneers in science he, and subsequently William Rogers, were in close friendship and frequent correspondence throughout the rest of their lives.

In the summer of 1833 Henry Rogers returned from Europe, and inspired William with new enthusiasm for the study of geology. The latter at once began researches into the thermal waters and into the unknown geological deposits, of possible commercial value, in Virginia, investigations which brought him into friendship and correspondence with prominent statesmen and men of science all over the country. In the following summer the two brothers began what was to be their lifelong scientific work by contributions on the marls and greensands of Virginia to the *Farmers' Register* and *Silliman's Journal*. In the succeeding winter began also what was to prove a long-continued effort to

induce the legislature at Richmond to authorize a geological survey of Virginia such as Massachusetts and several other States had already established. To show William's power of demonstration and persuasion, it is of interest to quote from a letter written at this time to Henry:—

RICHMOND, February 11, 1835.

I have been here for more than a week. . . . The object of my visit you have already guessed. . . . A geological committee has been appointed by the legislature to report upon a survey. Unprepared as I was, I appeared before the committee two days ago, and, in an harangue of an hour and a half, so interested them in the matter that the members of the legislature requested me to make an address to them publicly on that subject. With but a few hours' warning, and without a note, and without even casting a thought upon how I was to address them, and with only one illustration (a magnified section), I marched into the hall of delegates yesterday evening at half-past seven. At least three hundred persons had already appeared, and many more crowded in afterwards. At my right were Mr. Stannard, Mr. Wickham, and several of the judges of the Court of Appeals. Around me on all sides were the numerous members of both Houses of Assembly. It might well have daunted a stouter heart than mine. But a scarcely momentary tremor gave way to the conscious feeling of the importance and dignity of the occasion, and I stood forth boldly and advocated, I think powerfully, the cause of geology, developing a few of its most important truths, and displaying the benefits which it professed to Virginia. I was listened to with a riveted and deep attention, which satisfied me of the interest which I excited; and without once halting or stammering or becoming confused I went on for upwards of an hour, and when I closed loud words of approbation followed me. . . .

The Act authorizing the survey was passed by Virginia March 6, 1835, and William Rogers was soon afterwards

appointed to be its head. In August of the same year he was elected Professor of Natural Philosophy in the University of Virginia,—a distinct promotion and one that, by removing him from the malarial climate of Williamsburg to the more healthful one of Charlottesville, probably saved him from an early death. Nevertheless, to the end of his life his health remained precarious.

The five years following were most active and laborious ones. To the work of teaching at the University of Virginia was added the planning and prosecution of the survey. Both enterprises, however, were seriously hampered,—the former by the riotous conduct of the students, the latter by the lack of competent assistants and by the unfriendliness of the politicians. It is not necessary to enter into the well-known story of the insubordination of the young men at the university, with its accompaniments of rioting; but the atmosphere of disquiet, the interruption to serious work in the university and in his own lines of study and his anxiety over the really alarming conditions, did much not only to impair Professor Rogers's health, but also to turn his thoughts to those communities where the conditions of academic life appeared to be more favorable. The active part which he took in suppressing those demonstrations and in making the public understand the true issues between the Faculty and the students of the university was, however, to stand him in good stead in later years, as was also the wide experience which he gained of legislatures and of politicians through the unceasing fight that he had to carry on at Richmond in order to persuade the legislators there to maintain the geological survey. On the scientific side he had literally to create and to educate assistants to perform the detailed work of exploration, observation and mapping; and he could hardly have carried



East Lawn, University of Virginia

on the work, doubly burdened as he was by the affairs of the university, had it not been for the advice and active help of his brothers Henry and Robert. The former, as State Geologist both of Pennsylvania and of New Jersey, was carrying on his work, of course, in closest coöperation with the survey in Virginia; and the latter, at considerable sacrifice, abandoned for a time his projected medical career in order to go into the field, there to work as an assistant himself and to train others to those duties.

The actual survey of Virginia occupied from 1837 to 1842, but the work of mapping and preparing for publication, and the labor of securing the money and authority from the legislature of Virginia, occupied many years more. The result of the survey, of course, was greatly to stimulate the development of the State,—a result which would have been more marked had it not been for the Civil War. The influence upon the country as a whole was greatly to foster interest in scientific matters and to increase respect for the results of scientific research. As to the effect upon Professor Rogers himself, it was to bring him into that notice of the learned all over the world which his work as a student had long merited, it was to broaden his own horizon in matters of science and of thought, and it was to stimulate in him a dissatisfaction with the somewhat narrow field of his professorial work which, eventually, were to result in the highest benefit to the cause of education. Therefore, his first journey to Boston, in 1842, when he and Henry Rogers read a joint paper before a meeting of the American Geologists and Naturalists, was really a great event, for it at once gave him a taste of the life of what was then the leading city, in learning, of the United States, and awakened in the people of Boston a great interest in these remarkable men whose enthusiasm and fervor of

speech were novel to New England ears. Both brothers were elected honorary members of the recently established Boston Society of Natural History, with which William later was to be so closely concerned, and both established friendships in Boston which were to prove lifelong.

The aspiration of Professor Rogers for wider fields of work did not lead him, however, to lose interest in teaching or in the problem of developing the University of Virginia. So efficient, on the contrary, was his work both as a teacher and as an administrator that in 1844 he was chosen Chairman of the Faculty of the University, a position substantially equivalent to that of President, since, by the constitution given to it by its founder, Jefferson, the university had then no chief executive. This office, moreover, was in no sense a sinecure. During the winter of 1844-45 political and other jealousies induced the legislature of Virginia to propose to withhold the grant of \$15,000 which the university had received annually for a number of years, and upon which its very life depended. Professor Rogers went to Richmond and advocated the cause of the college with such force that, despite much opposition, the grant was made. The report of the committee recommending the appropriation was written by Professor Rogers, and, in view of later developments in higher education, the following extracts are especially noteworthy:—

On comparing the system of intellectual culture adopted in this institution with that in use in the higher seminaries of learning in other States, we remark two distinctive features which, from their influence upon the interests of education, may be deemed worthy of especial note. The *first* is the privilege allowed to students of selecting such studies as have a more immediate reference to the pursuits in which they design afterwards to engage, and the *second*, the practice of combining, to an unusual extent, oral instruction in the form of lectures with the use of text-books.

It should here be added that many years before the establishment of the University the privilege of an election of studies was allowed at William and Mary. Within her venerable precincts liberal methods of instruction found a home long before they were adopted by the thronged and applauded colleges of New England; and in her halls were delivered, by Bishop Madison, the first regular courses of lectures on physical science and political economy ever given in the United States.

It is not unworthy of remark that the advantages of such an election of studies, clearly evinced in the experience of the University, have been substantially recognized of late by the adoption at Harvard, and we believe other prominent institutions abroad, of a similar feature, to replace the Procrustes system hitherto in general use. But we may be allowed to add that, while engraving upon their old established methods this liberal improvement, they have allowed much latitude of election even to their candidates for the higher honours, and, thus departing from the stern requisitions of our University, have held out inducements to the student to choose his studies rather in accordance with his fancy or love of ease, than with the claims of a rigorous mental discipline and a more profound and thorough scholarship. . . .

. . . While referring to those features in the organization of the University which distinguish it from most of the leading institutions in this country, and which are regarded by its friends as among its highest merits, it is appropriate to state that by an express law its authorities are forbidden to grant honorary degrees, and that accordingly no diploma of compliment has ever yet received its imprimatur. . . . the legislators of the University have, we think, wisely made their highest academic honour, that of Master of Arts of the University of Virginia, the genuine test of diligent and successful literary training, and, disdaining such literary almsgiving, have firmly barred the door against the demands of spurious merit and noisy popularity. . . .

Partly for relief after the strain of the hard year at Charlottesville and Richmond, and partly to pursue his geological

researches, Professor Rogers, together with his brother Henry, spent the vacation season of 1845 in a journey through the White Mountains of New Hampshire and to the regions of Lake Superior. During the former portion of this journey he met the family of the eminent genealogist, James Savage, Esq., of Boston, author of the "Genealogical Dictionary of the First Settlers of New England." Visiting them in Boston, two years later, he was thereafter a frequent and welcome guest, and had the good fortune to win the affections of Mr. Savage's eldest daughter, to whom on June 20, 1849, he was married.

The year 1846 is of peculiar interest to Institute men, for in that year the idea of the Massachusetts Institute of Technology began to take shape in the minds of William and Henry Rogers. Already, in 1837, on behalf of the Franklin Institute of Philadelphia, they had drawn up a memorial to the legislature of Pennsylvania recommending the creation of a "School of Arts"; but this seems to have come to naught.

In 1846, however, Henry being a candidate for the Rumford Professorship of Geology at Harvard College, and his appointment involving a reorganization of the scientific side of the university, the attention of the brothers was particularly turned to the problem of how science, and especially applied science, might secure recognition in the colleges then, and for many years later, bound fast to the classical traditions. Henry Rogers suggests the possible creation of a sort of "extra faculty" School of Science at Harvard, and attempts also to enlist the aid of Mr. John Amory Lowell who, as trustee under the will of his cousin, was engaged in establishing the "Lowell Institute." Of this work Henry writes to William:—

... His plan would be to teach the operative classes of society,—builders, engineers, practical chemists, manufacturers, etc.; to admit in the first year only in limited numbers, and to teach them regularly; to have, perhaps, two permanent and salaried professors at the head of it, and to make up the rest of the instruction by assistants and by teachers, who would give courses of instruction occasionally on special branches. How much I want you near me at this time to aid me in digesting and submitting my views on this important scheme to Mr. Lowell! If you and myself could be at the head of this Polytechnic School of the Useful Arts, it would be pleasanter for us than any college professorship, for there would be less discipline, indeed, no more than with medical students. At no distant day, if not indeed soon, Mr. Lowell will, I hope, organize such a branch in his Institute; and if he does not you and I can surely get one founded here by going about it in the right way. . . .

To this letter the elder brother replies:—

... Ever since I have known something of the knowledge-seeking spirit, and the intellectual capabilities of the community in and around Boston, I have felt persuaded that of all places in the world it was the one most certain to derive the highest benefits from a Polytechnic Institution. The occupations and interests of the great mass of the people are immediately connected with the applications of physical science, and their quick intelligence has already impressed them with just ideas of the value of scientific teaching in their daily pursuits. Besides this, the high prevailing taste, diffused from the upper to the inferior classes of society, inspires an earnest appetite for richer intellectual food than they can now readily obtain.

And he encloses a "Plan for a Polytechnic School in Boston," in which is outlined substantially the scheme of the Massachusetts Institute of Technology as it is carried on to-day.

Throughout that and the following year his letters to his brother breathe an intense longing to get away from the

teaching routine of the university, and to exert, preferably in Boston, that power of initiative and of organization in education which he felt to be so strong within him. In the summer season of both years he visited Massachusetts, doing so in 1847 for the express purpose of presiding over the last meeting of the Association of American Geologists and Naturalists when it resolved itself into the American Association for the Advancement of Science. In this important work of reorganization he participated actively and, of course, performed an important share.

His growing interest in the plan of a polytechnic school, together with the fact of his engagement to Miss Savage, impelled him, in 1848, to tender his resignation from the University of Virginia. So distressed, however, were the governors of the university and his colleagues of the faculty at this step, and so solicitous were they to have him remain, that he finally reconsidered and withdrew his resignation. In that year he received his first degree of LL.D., from Hampden-Sidney College. Subsequent degrees of LL.D. came from William and Mary in 1859 and from Harvard in 1866.

As already stated, on June 20, 1849, he was married to Miss Savage, and on the same day they sailed for England. After an agreeable tour through parts of Great Britain and the Continent, Professor and Mrs. Rogers went to the meeting of the British Association for the Advancement of Science, at Birmingham. Of this meeting Dr. Rogers says, in a letter to his brothers:—

... No one could have been more warmly and heartily welcomed than I was, not merely by those who personally knew me, but by the scientific men generally, with the greater number of whom I soon became acquainted,—Darwin, Ansted, Ramsay, Mallet, Oldham, Griffiths, and, above all, Murchison, Sedgwick, and

Phillips among the geologists, taking me cordially by the hand. Phillips, Murchison, and De la Beche were throughout generously kind to me, and Lyell and Horner scarcely less so. The chemists were no less hospitable,—Percy, Playfair, Hunt, Stenhouse, Warrington, etc., all paid me kind attentions. In the physical section I was rarely able to be present, yet I esteem myself happy in having made the acquaintance of Brewster, Robinson, Adams, and Faraday. . . .

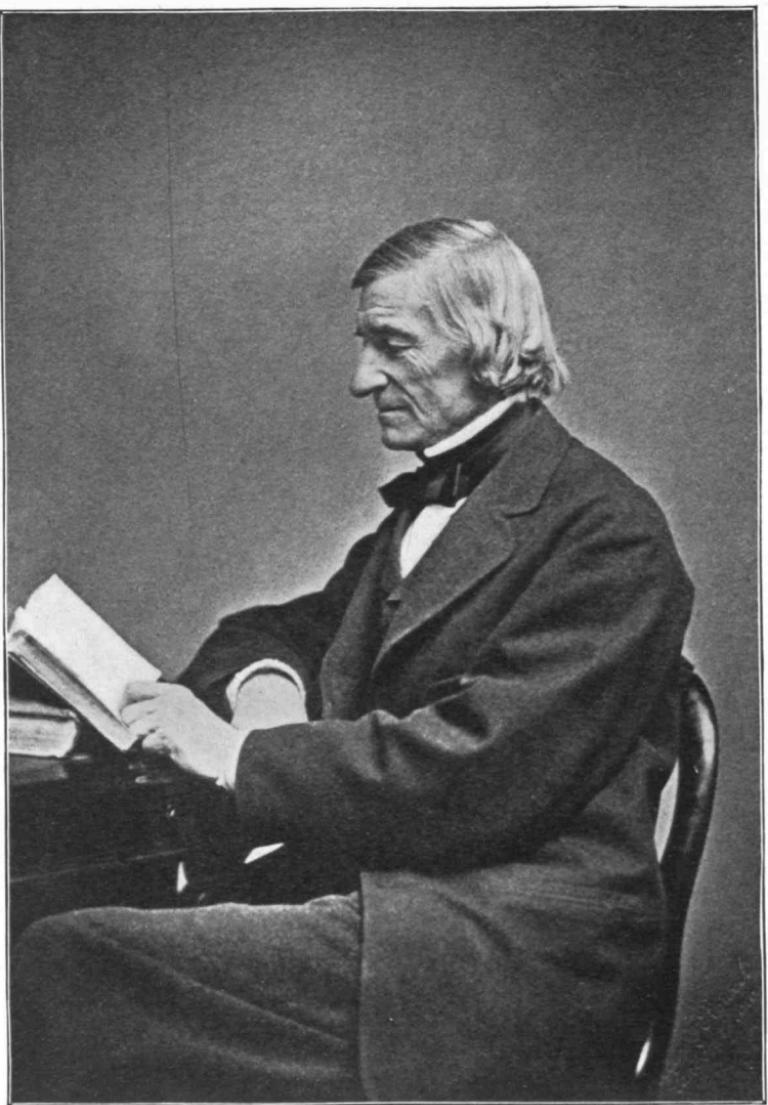
Of the speech which Professor Rogers made at the great banquet with which this meeting ended, Professor Mallet afterwards wrote:—

. . . Although I was but a boy at the time, attending the meeting with my father, I recollect most distinctly the marked impression made upon the assembly by Professor Rogers's speech, and the enthusiasm it kindled. It came late in the evening, after much, perhaps most, of the matter appropriate to the occasion had been already utilized by others; yet it was clearly the success of the banquet. . . .

Returning to the University of Virginia in the fall of 1849, Professor Rogers remained there until the spring of 1853, busy during the college terms with his teaching, spending the summer vacations in travel and in geological investigations, and steadily pressing forward the publication of his "Report on the Geology of Virginia." At the close of the college year, 1852-53, for the second time and definitively, he tendered his resignation from the university, and took up his permanent residence in Boston. Many things impelled him to this step which was, of course, a hazardous one. Among them were his desire for that opportunity for study which the onerous duties at Charlottesville did not allow, his wish to hasten the publication of his geological report, and, perhaps above all, his longing to carry out in Boston that plan for a polytechnic school the outline of

which had for so long existed in his mind, and the details of which were so rapidly shaping themselves in his fertile and constructive brain. It was, moreover, necessary for his wife to be with her father. Until 1871 the winter residence of Mr. and Mrs. Rogers was with Mr. Savage, at No. 1 Temple Place, and for almost as long a time their summer home was at "Sunny Hill," a charming house overlooking a wide landscape at Lunenburg, Mass. In the summer of 1857, however, Professor Rogers went for a few months to Great Britain, where he attended the meeting of the British Association at Dublin. On October 1 of that year he had a narrow escape from death, a large stone thrown through the window of the railway carriage in which he was travelling towards Norwich, England, striking him in the cheek and causing a slight fracture of both jaws.

With the fall of 1859 began Professor Rogers's direct activity in the work of establishing the institution which was to develop into the Massachusetts Institute of Technology,—an activity that increased until this object became the absorbing interest of his life, and identified him for all time as the chief agent in an educational development which has been of incalculable moment to education and to industry, not only in Massachusetts and in the United States, but throughout the civilized world. As has already been shown, this determination to establish a school of applied science was no sudden one on the part of Professor Rogers. Ever since 1837 he had been cherishing the idea of it, and as early as 1846 he and his brother Henry had put forth a project for a polytechnic school in which the scope of such an institution had been quite completely formulated. Neither had this plan for what was later to be called the Massachusetts Institute of Technology been a sudden and spo-



William Barton Rogers, 1869

radic growth in Boston. On the contrary, the demand for the creation of a school of applied science had been a slow and legitimate development out of the needs of the times. New England, and especially Massachusetts, had been pioneers in building up the manufacturing industries. Her considerable water powers; the diminishing returns from her agriculture in competition with the far more fertile acres of the Middle West; above all, the restless energy of her well-educated population, having at command large financial resources,—had impelled Massachusetts early to avail herself of those scientific discoveries and inventions which were to revolutionize production and transportation and were, therefore, to put a wholly new face upon American civilization. In the very beginning, however, those large-minded manufacturers met with every difficulty from lack of men fitted to carry on and to develop the various industrial processes. For many years they had either to depend upon foreigners or to train men, by laborious and expensive processes of self-teaching, for positions as industrial overseers. The established institutions of higher learning, with the exception of the Rensselaer Polytechnic Institute at Troy (which, however, limited itself to the training of civil engineers in the more restricted meaning of that term), were sublimely indifferent to the needs of the times and continued to give mediæval training to men who must deal with nineteenth-century conditions. However indifferent the college world, the commercial world had felt this need for a number of years, and, as industry developed, the situation grew more and more acute. The Brothers Rogers had shown quite clearly how the proper industrial training might be supplied, and in the Lawrence Scientific School the demands of industry had been in a measure met. But, as Professor Rogers had pointed out, the relations of that school to the parent university were

so close, the old tradition of Harvard was so much stronger than the new impulse from the subsidiary school, that it could not, as indeed it did not, serve in any very large measure the purposes of the industrial leaders. Those leaders, therefore, on Feb. 18, 1859, called a meeting at the rooms of the Boston Society of Natural History to consider and act upon the question of fitting men properly to deal with the expanding industrial conditions. As a result, a committee of seven was appointed, with power to memorialize the legislature for authority to establish a "Conservatory of Art, Science, and Historical Relics."

The committee thus commissioned lost no time in presenting their petition. Premising that four squares of the proposed Back Bay lands be reserved for this "Massachusetts Conservatory," the petitioners suggest that "Section No. I. might be devoted to collections of implements, models, and other objects pertaining to Agriculture, Horticulture, and Pomology.

"Section No. II. to Natural History, Practical Geology, and Chemistry, with ample room for museums of specimens.

"Section No. III. to those institutions devoted to the development of Mechanics, Manufactures, and Commerce.

"Section No. IV. to Fine Arts, History, and Ethnology.

"It is not proposed," the memorial states, "to merge the different institutions in one,—the perfect individuality of each being retained in every respect, having nothing necessarily in common but the general fostering care of the state."

This first exposition of the plans of its promoters shows their scheme to have been essentially a popular one. They hoped to provide higher education for the people, to train artisans and mechanics in such wise that the relations between them and the men of science might be close and cordial, and that the theories of the latter might be verified

and checked by the work of the former, who, in their turn, would derive incalculable benefit from the experiments and researches of the scientists. Popular lectures, skilfully arranged museums, published reports, were to be the means of education, and examinations and other tests leading to diplomas were to form the immediate aim and measure of the work. This popular aspect of the plan was emphasized by the *Conservatory Journal*, a short-lived newspaper issued during April, May, and June of the year 1859, the publication of which led to a sharp controversy and eventually, in all probability, to a more ready acceptance of the maturer and wiser plans of Professor Rogers.

This first petition, because of the late date at which it reached the legislature, failed of consideration. Professor Rogers's name was attached to it, but his absence in Virginia, "partly to comply with repeated opportunities to lecture in Richmond, and partly for geological work," prevented him from taking an active part in this first formal attempt. In the following year, however, we find him writing to Henry, in January, 1860:—

Our (or rather my) Memorial is before the legislature, and will probably be acted on next week. Thus far the sentiment is strongly in its favour. We ask for from eight to ten acres of the Back Bay land for buildings to accommodate the Natural History, Horticultural, Agricultural, Technological, etc., societies. The plan is magnificent, and if carried out will do great service.

My Memorial is under investigation before the Committee on Education. They have given us two evenings, and will to-morrow allow us another and probably the last. Thus far much of the talking, as well as writing, has fallen to me. We have a good prospect of success. But you know that the course of legislation is not to be inferred from the action or report of a committee. . . .

Until lately I did not imagine that any jealousy could be felt towards a plan which contemplates almost entirely popular and economic objects. . . .

For the second time, however, the legislature refused to grant any of the Back Bay lands for the creation of a "Conservatory of Arts and Sciences." This was due partly, as Professor Rogers states in his "Account of the Proceedings Preliminary to the Organization of the Massachusetts Institute of Technology," to "the incompleteness and vagueness in which they had presented this department of their general plan," but it was owing still more to the active opposition of the public school authorities, to whose use the money from the sale of the "Back Bay Lands" had been appropriated, and who feared lest some of their fund be alienated.

In no way daunted by the indifference of the General Court, the committee convened again on May 28, 1860, and "assigned to a sub-committee, consisting of W. B. Rogers, E. B. Bigelow, J. M. Beebe, M. D. Ross and C. H. Dalton, the duty of preparing and reporting upon the plan of an Institution designed for the advancement of the Industrial Arts and Sciences and Practical Education in the Commonwealth." As chairman of this sub-committee, Professor Rogers prepared, for wide distribution throughout the State, his well-known "Objects and Plan of an Institute of Technology," in the course of which he says:—

In New England, and especially in our own Commonwealth, the time has arrived when, as we believe, the interests of Commerce and the Arts, as well as of General Education, call for the most earnest co-operation of intelligent culture with industrial pursuits. Our success hitherto in the competitions of trade, manufactures, and the other productive arts, has been the admitted result of the superior intelligence which has inspired our enterprise and guided our ac-

tivity; but, to secure a steady prosperity in the midst of the busy inventions and rapidly expanding knowledge which mark these pursuits in the leading European nations, we feel that it has become indispensable for us to provide, at least as effectually as they have done, such facilities for practical knowledge, and for the intelligent guidance of enterprise and labor, as may make our progress commensurate, step by step, with the advances of scientific and practical discovery. . . .

With the view of securing the great industrial and educational benefits above alluded to, it is proposed to establish, on a comprehensive plan, an Institution devoted to the Practical Arts and Sciences, to be called the MASSACHUSETTS INSTITUTE OF TECHNOLOGY, having the triple organization of a Society of Arts, a Museum or Conservatory of Arts, and a School of Industrial Science and Art.

Under the first of these characters,—that of a Society of Arts,—the Institute of Technology would form itself into a department of investigation and publication, intended to promote research in connection with industrial science, by the exhibition, at the meetings of the Society, of new mechanical inventions, products, and processes; by written and oral communications and discussions, as well as by more elaborate treatises on special subjects of inquiry; and by the preparation and publication, statedly, of Reports exhibiting the condition of the various departments of industry, the progress of practical discovery in each, and the bearings of the scientific and other questions which are found to be associated with their advancement. . . .

In organizing and conducting the Museum of the Institute, reference should be had rather to the extent of practical instruction to be derived from it than to the multitude of objects which it might embrace. . . .

The productive talent of the community, as measured by its proficiency in the practical arts, requires for its steady and rapid development other helps than can be offered by the treasures of a museum, or the discussions and publications of a Society. While it would, doubtless, profit largely by the opportunities for instruction which collections and publications can afford, it demands yet more

urgently that *systematic training in the applied sciences* which can alone give to the industrial classes a sure mastery over the materials and processes with which they are concerned. . . .

It would seem, therefore, eminently expedient, in the organization of the Institute, to make provision for a Department to be called a *School of Industrial Science and Art*, in which regular courses of instruction should be given, by lectures and other teachings, in the various branches of the applied sciences and the arts; and where persons destined for any of the industrial pursuits might, at small expense, secure such training and instruction as would enable them to bring to their profession the increased efficiency due to enlarged views and a sure knowledge of fundamental principles, together with adequate practice in observation and experiment, and in the delineation of objects, processes, and machinery. . . .

To appreciate how the Institute, in Professor Rogers's mind, evolved from a proposed "Conservatory," in which instruction was to be mainly subsidiary to the collections, into a school in which the collections were to be merely aids to profound study and investigation of the truths of pure and applied science, it is needed only to read this pamphlet, the "Objects and Plan of an Institute of Technology," and that written and published not quite four years later by Professor Rogers, entitled "Scope and Plan of the School of Industrial Science of the Massachusetts Institute of Technology." The methods of reaching the goal differed somewhat markedly as, during the three or four intervening years, Mr. Rogers studied the problem and perfected his views; but the aim was the same in 1864 as in 1860 and, indeed, as in 1846; and in the two pamphlets the purposes, methods and ultimate scope of the Massachusetts Institute of Technology are set forth with a foresight of modern conditions, a comprehensiveness of plan, a lucidity, and a grasp of detail that have made it possible to bring

the Institute to its present size and complexity without departing in any essential degree from this fundamental conception. Rarely, if ever, has a preliminary "paper" scheme for a new enterprise of such magnitude been so in harmony with its development under the pressure of experience.

The "Objects and Plan" was sent to a large number of prominent men throughout Massachusetts, with the request that they enroll themselves as members of the proposed Institute. The response was eminently satisfactory, and at a meeting called at Mercantile Hall, 16 Summer Street, Jan. 11, 1861, a "preliminary organization was established," and the following were appointed "to represent the interests and objects of the Association until it shall be legally incorporated," and "to use its best efforts . . . to obtain from the legislature an Act of Incorporation for the Institute, and to secure a grant of land on the Back Bay for its use":—

W. B. Rogers, *Chairman*, J. M. Beebe, E. S. Tobey, S. H. Gookin, E. B. Bigelow, M. D. Ross, J. D. Philbrick, F. S. Storer, J. D. Runkle, C. H. Dalton, E. C. Cabot, J. B. Francis, J. C. Hoadley, M. P. Wilder, C. L. Flint, Thomas Rice, John Chase, J. P. Robinson, F. W. Lincoln, Jr., Thomas Aspinwall, J. S. Dupee.

How well the committee, and especially its chairman, performed their duties, is indicated by the following extracts. The first is from a letter of Professor Rogers's, under date of March 19, 1861:—

The crisis of our Technological plan is now approaching. A Report and Bill, prepared by me, have just been presented, and will, I suppose, meet with no serious opposition in the House. But we look for obstructions in the Senate, where we were defeated last year, and I am very busy corresponding with persons of influence in different parts of the State, in order to give the Senators a true appreciation of our plans. . . .

The second is from a letter written by Governor Andrew to Professor Rogers ten days earlier:—

My dear Professor,——The Board of Education will meet next Wednesday morning. I hope you will come and advocate the claims of the Natural History and Institute of Technology, but no one else should speak. Be thou the advocate. Take time enough. Cover the ground to suit yourself; several speakers would do harm; at least I fear they would. And you may say from me that I wish one complete argument, and that no other be made.

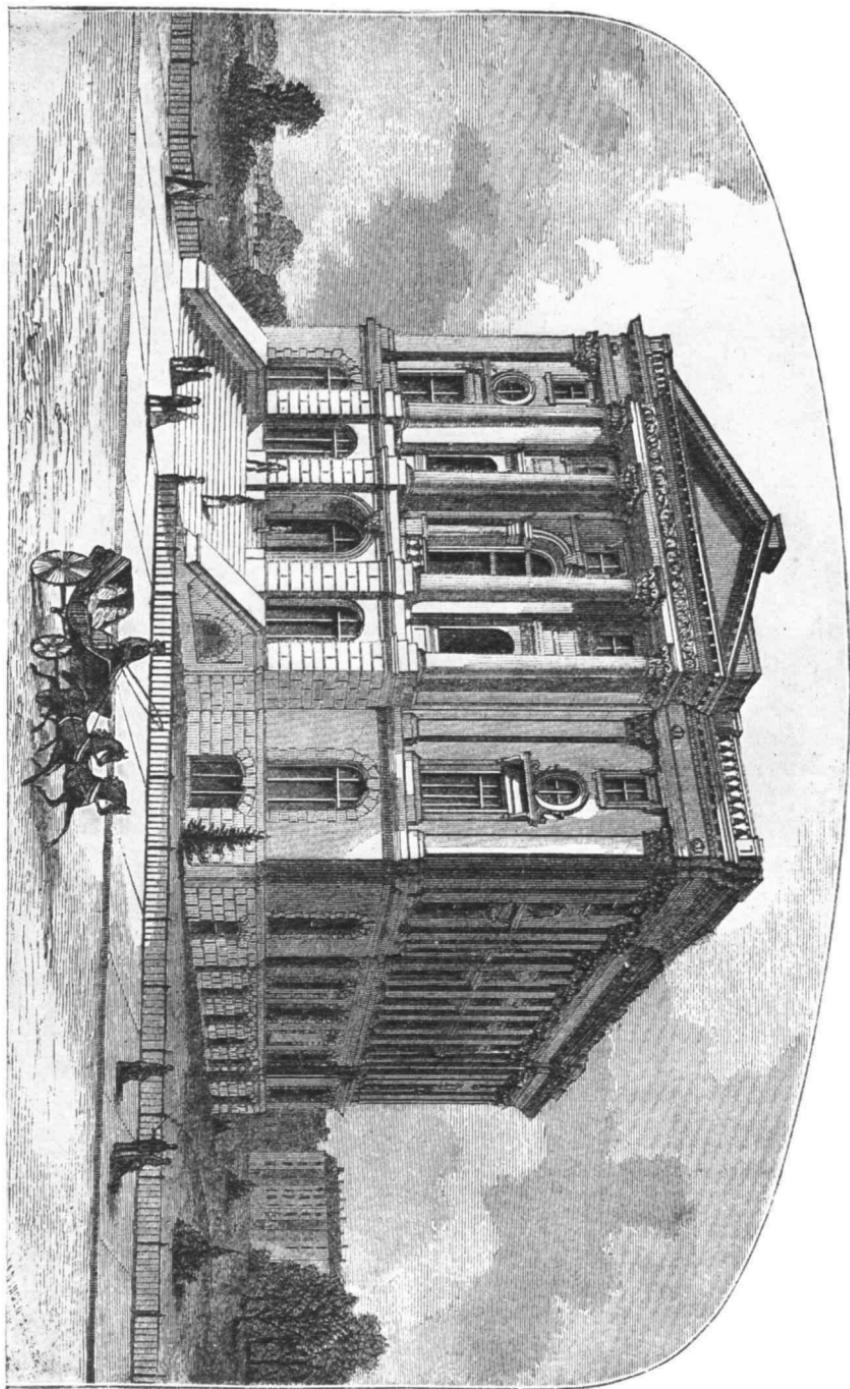
Between ourselves I know you would have a powerful effect, left to yourself, and I fear some one else might come in and weaken it.

Yours faithfully and fervently, JOHN A. ANDREW.

The third is in a letter dated April 2, 1861, to his brother Henry:—

. . . Since my last our Bill has dragged on through the House, and yesterday passed its second reading in the Senate after an earnest debate. The vote was twenty-six to nine, but an amendment of no great importance will compel it to go back to the House for concurrence, which may delay the final decision to the end of the week. We have little fear, however, of its success, as the amendment will be quite acceptable in the House. . . . Our Bill has required continual watching. Not only had I to write the Report of the Committee, but by personal interviews and correspondence, assisted by others interested in the cause, I have been continually occupied in trying to make members understand our plan and objects. I now feel so sure of success that I am quite relieved. . . .

The Act of Incorporation of the Massachusetts Institute of Technology was signed by Governor Andrew, April 10, 1861, only two days before the attack upon Fort Sumter. This first, and essential, step in the creation of a polytechnic museum and school had cost nearly two years of tireless work from the committee seeking the sanction of the legislature, and the chief burden of that labor had fallen upon



The Rogers Building, from the Seventh Annual Catalogue

the shoulders of Professor Rogers. His was the zeal, his was the knowledge, above all his was the eloquence that most effectively plead for the State's approval of this radical educational experiment. His experience of the Virginia legislature had shown him—as is made clear to any one who has to deal with elected assemblies—that such bodies are swayed far less by the arguments of promoters than by the pressure of public opinion. Professor Rogers, therefore, made it his chief work to create a public opinion that should support his arguments. This involved much correspondence, many personal interviews, long arguments with doubters, convincing expositions to the indifferent, tactful appeals to those more or less active in opposition. And all this had to be done at a time when men's thoughts were turned away from matters of education to burning questions of politics and of impending war. Mr. Rogers's own mind and heart, moreover, were deeply occupied and stirred by those vital matters. His long residence in the South had but intensified his loyalty to the Union and his abhorrence of slavery. The fact of his close acquaintance with conditions in Virginia gave his words added power and weight. Too feeble in health to take, as he would have liked to do, the part of a soldier in the great struggle, he followed with intense eagerness its every phase, he lent himself in all ways to the work of recruiting men, of raising supplies, of supplementing the service of the hospitals, and he suffered a bereavement comparable to that of a father in the death of his young brother-in-law, Major James Savage, Jr., a distinguished officer of the Second Massachusetts Regiment, who died of wounds received at Cedar Mountain.

That Professor Rogers's vision was as clear in the matter of this war as it was in questions of education is shown by the following extract from a letter written in 1862:—

By the close of the war there will devolve on the free States a stupendous labour of organization and education, not only for the blacks, but for a large part of the white population of the South. There is no idea of a subjugation, as other nations understand the term. But to overcome prejudice, to relieve suffering, and to enlighten ignorance throughout the desolated slave States will be the labour of more than the present generation, and will tax the nation's highest capacity of moral effort and of financial endurance. . . .

And, again, with what prescience he writes later in that year!—

The greatest event beyond comparison of the war is the late proclamation of the President, declaring the slaves of all rebellious States after January next to be *forever free*. On the 22d of September this momentous voice was uttered. On that day in a sublimer sense than ever before—*the sun crossed the line*. . . .

The four years of the Civil War, therefore, not only were filled for him with the anxieties common to that distressing time, they were crowded also with the labors and discouragements incident to creating, on the meagre foundation of an Act of Incorporation, a structure which should in some measure realize his vision of what the Massachusetts Institute of Technology ought to be. His first task in this direction was to meet, if possible, the condition properly made in the charter of the Institute, that within one year a sum of one hundred thousand dollars should be raised by its friends as a guarantee. But the first year of a great war in which vast sums of money were needed for equipping and maintaining troops and for establishing hospitals was not one in which even the most generous givers could be expected to grant money for what then seemed a somewhat visionary experiment. April 10, 1862, found the Institute Committee with nothing more tangible to satisfy the Gover-

nor and Council than five thousand dollars in money, a statement from Mr. Ralph Huntington that he would give \$50,000 in his will, and a letter from Mr. John A. Lowell in which he stated that:—

It has long been my intention, when the funds of the Lowell Institute should have sufficiently accumulated, to establish a school for the instruction of mechanics in the sciences connected with their trades. Should your Institute of Technology be successfully established, I shall avail myself of its advantages, if permitted, by opening this school on their premises, and devote to this object a sum not less than \$3,000 a year.

The seeming impossibility of securing money and the absorbing interests of the war had, moreover, delayed the formal organization of the Institute. Therefore, it was not until April 8, 1862, that the members of the "Institute" (that is, those gentlemen who had enrolled themselves in response to the call of the "Objects and Plan" in 1860) were convened, the charter accepted, by-laws adopted and officers elected. At that meeting Professor Rogers was elected temporary president, a petition to the General Court for a year's extension of the time for raising the endowment was drawn up, and the first annual meeting was appointed for May 6, 1862. At the annual meeting Mr. Rogers was formally elected president, Thomas H. Webb secretary, and Charles H. Dalton treasurer. At that meeting, also, was announced the first gift made to the Institute, the sum of three thousand dollars from the estate of Miss Sarah Townsend.

The first public meeting of the Institute—a meeting of the Society of Arts—was held on Dec. 17, 1862. President Rogers made an address in the course of which he said:—

It is proposed at an early day to make a beginning in some

branches of the School of Industrial Science, and in the collection of objects suitable for the intended Museum. While thus foreshadowing, however imperfectly, the illustrations and practical teachings which it is the aim of the Institute to afford, we may hope, even thus early in our enterprise, to contribute somewhat to the cause of practical science and industrial education and progress, and be the better prepared for a wise use of the accumulated resources by which our entire plan is to be brought into operation. . . .

Although the meetings of the Society of Arts continued to be held twice a month during the winter, the Institute, not having raised the money upon which its charter was contingent, had as yet no legal existence; and, as April 10, 1863, approached, the possibility of securing that sum seemed still remote. Almost on the last day of the expiring second year, however, word came to President Rogers that Dr. William J. Walker, then of Newport, R.I., though formerly of Charlestown, had agreed to give to the Institute one hundred thousand dollars. Within a few days, moreover, the legislature voted to appropriate to the use of the Institute one-third of the proceeds of the public lands granted, under the terms of the so-called Morrill Act, to Massachusetts for the promotion of education in agriculture and the mechanic arts. The remaining two-thirds were devoted to the Amherst Agricultural College.

In connection with the appropriation of this land grant fund, Governor Andrew and others brought forward a project for the consolidation of Harvard College, the Bussey Institute, and the Institute of Technology into one institution. Commenting on this project, President Rogers writes to Dr. Walker:—

Following the suggestion of the Governor in his inaugural address, a strong effort was made early in the session to secure a union of this entire prospective fund with that of the Bussey estate, and

to make the Agricultural College and the Institute of Technology parts of a grand plan centering in Harvard University.

The latter proposition, suggested at the hearing before the Legislative Committee, met with the instant reply from myself and others that the Institute had from the beginning determined to stand alone, that its independence was essential to its success, and that it would accept no grant from the State, or from any other quarter, which should in the slightest particular interfere with this independence. . . .

With the spring of 1863, therefore, began the active work of preparation for planning, building and equipping the School of Industrial Science. As has already been said, this part of the threefold plan of the Institute of Technology grew ever larger and more important in the mind of President Rogers, in time overshadowing the Society of Arts and eclipsing the proposed museum. The gift of Dr. Walker, whose views were strongly favorable towards, as Dr. Rogers expressed it, teaching "exactly and thoroughly the fundamental principles of practical science, with their leading applications to the industrial arts, and making this teaching as widely available as possible," and the State's appropriation of the Morrill Land Grant, the object of which was to further education in the mechanic arts, confirmed the president's own views, and made him eager, as his letters show, to begin the erection of a building "designed mainly for the teaching department" on the Back Bay land. In the fall of 1863 ground was broken for such a building (now known as the Rogers Building), 150 feet long by 100 feet wide; and Dr. Rogers, aided, as he says, by Professor Runkle and Dr. Watson, began to form courses in applied mathematics, applied physics, chemistry, etc., "reaching from the very elements up to the fullest demands of the scientific engineer." This work took shape, early in 1864, in the "Scope and Plan" already referred to. In this

pamphlet, President Rogers says of the "Plan of Instruction,"—

In arranging the plan of instruction for the School of Industrial Science and Art, provision is made for two classes of persons,—those who may be expected to resort to the lecture halls and school of design for such useful knowledge as they can acquire without methodical study and in hours not occupied by business; and those who enter the institution with the view of a progressive, systematic training in one or more branches of applied science, and who have the preliminary knowledge as well as time for the prosecution of its studies. . . .

The first object has been carried out, though imperfectly, for many years in the Lowell Free Courses of Instruction, lately developed into the Lowell Free School for Industrial Foremen, this side of Mr. Rogers's plan having, of necessity, to wait upon the more important and unexpectedly rapid and complicated development of the systematic four-year courses of the school.

Sept. 28, 1863, Mr. Rogers writes to his brother Henry:—

. . . I have a good deal before me in the way of work and care for this winter. I have to make up a report of my gas inspection, in which I shall include all my new apparatus and methods. The Institute depends upon me for arranging materials for the fortnightly meetings, and for getting up this autumn some courses of instruction by way of a preliminary trial of our plan. Still I believe I can get on with these duties without overwork, and I am resolved as much as possible to maintain calmness and quiet in all my labours.

The "report on gas inspection" refers to his office of Inspector of Gas Meters and Illuminating Gas for Massachusetts, to which he had been appointed in the summer of 1861. He was the first incumbent of this office, and he accepted it

mainly in the hope that it would "help his Technological plans." Into this new work, however, he had thrown himself with the zeal and thoroughness characteristic of him, familiarizing himself, in the first place, with the processes of manufacturing and testing gas, and then devising simpler and more accurate methods for obtaining satisfactory proof of the quality of the illuminant furnished to consumers. But this labor, added to the work of building up the Institute, to his geological researches, and to his many other interests,—including the establishing of the National Academy of Sciences, of which he was a charter member,—proved too much for his delicate constitution, and the winter of 1863-64 found him suffering from insomnia and other nervous ills. For that reason he resigned, in March, 1864, the office of gas inspector, and in June sailed, with Mrs. Rogers, for Europe. Before his departure he was commissioned by the government of the Institute to purchase models and apparatus, at his discretion, to an amount not exceeding £1,000, and was asked to accept—being in receipt of no salary from the Institute—a gift of £250 toward his expenses which, in view of the high rate of exchange, would be abnormally great. The commission he was glad to execute: the gift he cordially but firmly refused. The summer was spent in quiet travelling, in visits to friends, new and old, in attendance upon the meetings of the British Association at Bath, and mainly in studies of schools, museums, etc., from which he might hope to get ideas bearing upon the development of the Institute.

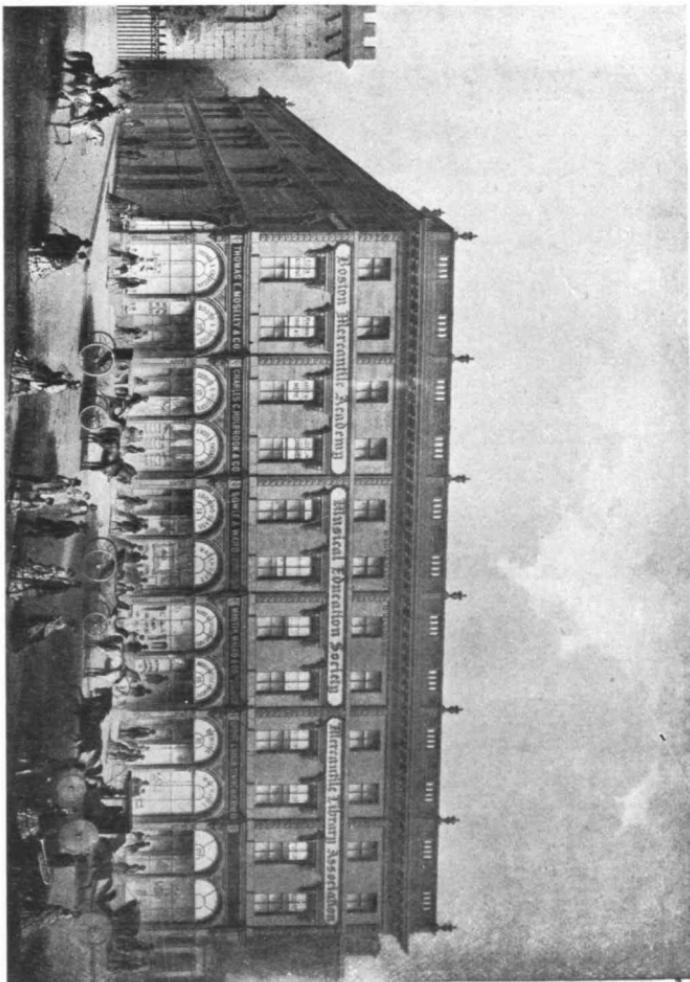
Upon his return, early in November, President Rogers was welcomed at a specially called meeting of the government of the Institute, and shortly afterwards he gave before the Society of Arts an account of his observations during his recent trip.

With the return of the President of the Institute, renewed in strength, preparations were at once actively begun for the opening of the long-projected School of Industrial Science. On Feb. 20, 1865, Professor Rogers writes in his diary: "*Organized the school! Fifteen students entered. May not this prove a memorable day!*" The courses established on that date were physics, in charge of the President; mathematics, under Professor John D. Runkle; chemistry, under Professor F. H. Storer; civil construction, under Professor William Watson; French, taught by Professor Ferdinand Bôcher; and free-hand drawing, taught by Mr. W. T. Carlton. The sessions were held at 16 Summer Street, and the classes, beginning with the department of chemistry, were only gradually removed, during 1865 and 1866, to the new building (now the Rogers Building), which, owing to the war, had been delayed a year in its erection and had cost nearly twice the original estimate.

During the summer of 1865, a professorship of chemistry was offered to Mr. Charles W. Eliot, who was then abroad, and to whom, therefore, President Rogers wrote with much fulness of the plan and spirit of the school. In this letter appear the following significant paragraphs:—

Long experience has taught me the importance of giving to each professor a wide latitude in the choice and use of his plans and means of instruction, making him, in fact, within reasonable limits, the sovereign in his department, but at the same time holding him of course responsible for its successful administration. . . .

The object of the school being to afford instruction to all who are prepared to benefit by its teachings, whether in a continuous curriculum of studies or in some particular division of them, its policy in the admission of students and in the individual distribution of studies will be one of pliancy rather than rigidity, helping the develop-



Mercantile Library Building, 16 Summer Street

ment of a special talent as well as the general capacity of the pupils; at the same time stimulating and enforcing industry, and maintaining good order by stated oral and written examinations.

On Oct. 4, 1865, the American Association for the Promotion of Social Science was organized in Boston, and Dr. Rogers was elected its first president. It is interesting to note that its annual sessions of 1903 and of 1904 were again held in Boston, with the Institute as host.

The winter of 1865-66 was passed agreeably in the congenial work of perfecting the organization of the Institute; but in the late spring came tidings of the serious illness, in Glasgow, of Professor Henry Rogers. The brothers hastened across the ocean, only to find that death had supervened soon after they left these shores. For William Rogers to lose this brother, whose work and even whose thoughts he had shared for so many years, was like losing a part of himself. This stunning blow was followed by another serious shock in the sudden death of Dr. Thomas H. Webb, the first Secretary of the School. These disasters, together with anxiety over the pressing debts of the Institute, threw President Rogers into a fever, from the effects of which he did not recover for many months. He was able, however, to exercise general supervision over the Institute's third session; and in June, 1867, having been appointed Commissioner from Massachusetts to the Paris Exposition of that year, he sailed with Mrs. Rogers, and with Professors Eliot and Storer as assistants, for Europe. Spending the summer in studying the Exposition and in making other investigations bearing upon the work of the Institute, the President again took up his full duties—with the exception of the teaching of physics, which he had transferred to Professor E. C. Pickering—at the opening of the session of 1867-68. Within a month, however, he was stricken with

a partial paralysis, which made it imperative for him to seek absolute rest. Granted leave of absence for a year, he passed the winter with his brother Robert in Philadelphia, and spent the following summer at Newport. Only by extraordinary care and the most skilful nursing was he brought through this critical illness, and for the remaining fifteen years of his life he continued in a state of invalidism that with a man of less indomitable will would have precluded even the thought of mental and physical labor. With Dr. Rogers, however, ill-health was but another of the obstacles to be overcome in carrying out his plans for building up the Institute. It sometimes compelled him to suspend for a time his active connection with the school, but it never forced him to cease working for that absorbing enterprise until the very moment of his death.

Upon granting leave of absence to Dr. Rogers, the Corporation appointed Professor Runkle acting president; and the following letter from Professor Atkinson testifies to his devotion in that temporary office:—

My dear President, . . . You must console yourself in your enforced idleness with seeing how extremely well Runkle is carrying out your plans, and how smoothly our ship holds on its course. I think there never was anything like it before, and I do not flatter you when I say that I attribute it to the wisdom of your original planning. The throwing overboard of all rusty, old, worn-out college machinery, and a quiet but decisive breaking off from all entangling alliances with venerable old humbugs, and putting us in care of new men full of the activity of modern thought,—these are what have kept us going so smoothly, and I am sure will keep us.

I think we shall be safe while we pursue this policy, and in danger as soon as we abandon it.

Although able to receive and to write letters,—as had not been the case for a number of months,—President Rogers

was quite unable to resume his administrative duties at the opening of the session of 1869-70. He again sought, therefore, for that winter the more genial climate of Philadelphia. Meanwhile the resources of the Institute—quite inadequate in the beginning and difficult to increase because of the unsettled state of business subsequent to the war—grew less and less. So uncertain was the outlook that it led to the entertaining by the Corporation of the Institute of proposals from Harvard College for an alliance with that institution. This plan of union was carried to the point where it needed only the sanction of President Rogers. President Eliot went to Philadelphia to lay the matter before him. The following extract from the note-book of Dr. Rogers gives the result of the interview:—

Visit from Charles Eliot from 11 1/2 to 12 3/4. He made a full statement of the plan as far as formed. Mentioned that Messrs. Lowell, Thayer, Bowditch, and Judge Bigelow favored the annexation and thought it would be a *noble* thing for me to agree to it. I replied that I would be purely and wholly guided in anything I did or agreed to by what I regarded as the interest of the Institute and public. That I could not see any advantage to the Institute from the proposed change but the gain of some funds—but that the Institute would be a *great loser* by relinquishing its present independence, and that this would be the real result however veiled in the plan. . . . He again spoke of the wish to name our school for the Rogers family. I expressed my repugnance to all such names.

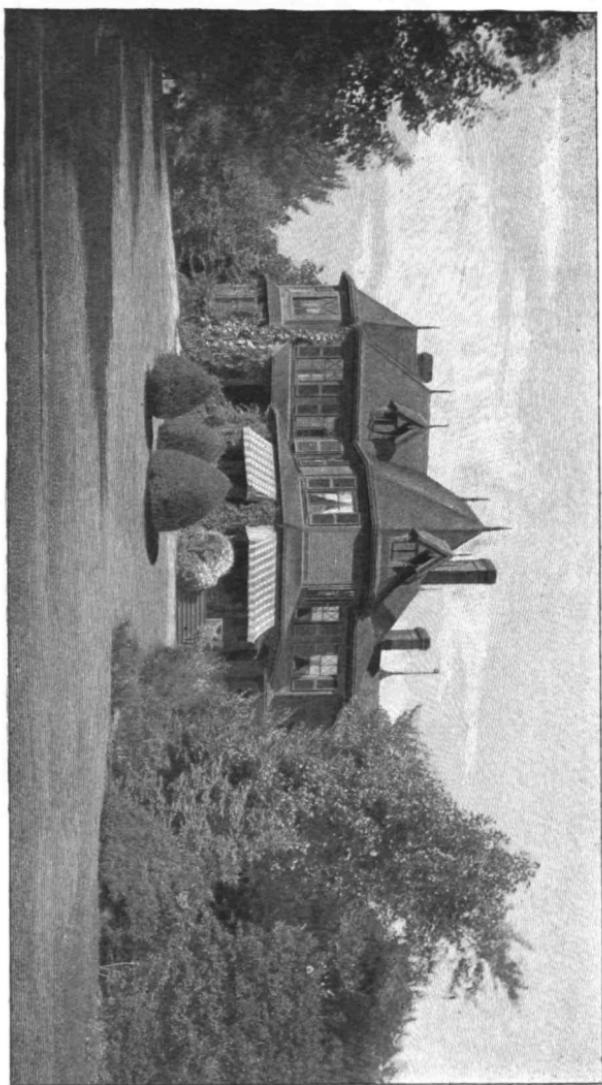
His letters and diary for the rest of the year are filled with anxious references to this proposed annexation and with cogent arguments against it.

Since his health improved but slowly and capriciously, Dr. Rogers felt it his duty to resign the Presidency in the spring of 1870. His diary records, on May 2: "Wrote Runkle of my purpose to resign Presidency. A memorable

event for me! Sad, sad necessity." His resignation was accepted with extreme reluctance by the Trustees and Faculty, and only in the belief that, being thus freed, his strength would more rapidly return, and in the hope that at some later time he might resume the office. In the following October, after a somewhat prolonged contest hinging upon his opposition to the projected alliance with Harvard, Professor Runkle, who for two years had been acting as President, was elected to the vacancy.

The next few years were, for Professor Rogers, years of almost continuous search for health under the advice of specialists and under the most favorable conditions of climate, of freedom from excitement, and of well-guarded rest. Throughout this trying time, however, his thoughts were uninterruptedly with the Institute of Technology, and in intervals of better health he gladly advised the President and others upon the many perplexing questions which could not fail to confront so new and difficult an educational experiment. Every summer was now spent at Newport, the warm, soft air of which had proved most beneficent; and in October, 1872, he moved into the house "Morningside," which he and Mrs. Rogers had built on Gibbs Avenue, and which has ever since been the scene of delightful hospitality. The winters of 1871-72 and of 1872-73 were spent at the Hotel Berkeley in Boston, almost opposite the Institute. The removal from the former winter home had been made necessary by the cutting through of Temple Place to Washington Street, converting it into a business thoroughfare. This advance of trade into what had been a secluded group of comfortable residences was sorely resented by Mr. Savage; and, already enfeebled by age, he did not long survive the change. He died March 8, 1873, in his eighty-ninth year.

By December, 1873, Professor Rogers was so far restored



"Morningside," Newport, Rhode Island

in health as to be able to say, in writing to a friend, "I am well enough to enjoy much and even to do a *little* scientific work." Not least among the pleasures in which he could partake were the meetings of the Thursday Evening Club—established by Dr. John Collins Warren—of which Mr. Rogers had been president for some years. On the scientific side he gradually became able to study and investigate again, then to write regarding his researches, finally to speak publicly concerning them. By the summer of 1875 it was safe for him to undertake a journey to Virginia, in order to make an address at the semi-centennial of the University. There, and upon other occasions in which he was able to participate, he spoke with the eloquence, the fire, the grace of diction and aptness of illustration which had always characterized him. This power and felicity of speech, together with the extraordinary range of his learning and of his interests in an age when science was being parcelled into specialties, made him greatly sought as a presiding officer and as an orator. Most of those many invitations he felt compelled to decline; but each year found him able to assume more work and responsibility until, in 1876, he felt himself strong enough to accept the proffered presidency of the American Association for the Advancement of Science. In 1879, moreover, on the death of Dr. Joseph Henry, Professor Rogers was elected president of the National Academy of Sciences, of which he had been one of the incorporators and in the sessions of which he had always taken a deep and, as far as his health allowed, an active interest.

Meanwhile the financial affairs of the Institute of Technology had been growing more and more discouraging. This was due mainly to the panic of 1873, the recovery from which had been very slow, and one of the results of

which, of course, was to diminish markedly the number of young men for whom higher education was possible. By 1878 the number of students at the Institute, which in 1875 had risen to 258, fell to 179, and the institution was on the verge of bankruptcy. Moreover, the long strain had told severely upon the strength of President Runkle, impelling him to resign and to seek recuperation in residence abroad.

In this crisis—the most serious which the Institute has ever encountered—almost the only hope for the life of the school lay in a renewal of Professor Rogers's active participation in its affairs. Although still far from being a well man, he accepted the sacrifice which the Corporation asked of him, and reassumed the Presidency, stipulating only that his term of office should terminate immediately upon the choice of a competent successor, that \$100,000 should be raised towards lifting the burden of debt, and that a chairman of the Faculty should be appointed to administer the details of the executive office. To meet the second of these conditions required more than two years of arduous labor. Regarding this attempt to raise funds the President writes to Professor Runkle in June, 1879:—

You have already been informed of the plan of retrenchment adopted in the autumn, leading to the resignation of Dr. Kneeland in January, and involving the discontinuance of Professor Howison's department, the reduction of salaries and the diminishing of the number of assistants, to take effect on October 1 next.

The economies carried out during the past session in the laboratory and other current expenses have been large, but they have been more than balanced by the diminished income from students, and by the necessity of employing a distinct teacher of mathematics, etc.

The subscription (to which I have given no small time) has now reached within a few hundred of \$61,000, with a prospect of additions for the next four months; we may bring it up to \$75,000 by

the opening of the next academic year. Add to this that Mr. Lowell has lately agreed with me for the occupation of Huntington Hall next season for the Lowell Lectures at a rent of \$2,500, an arrangement which can hardly fail to be permanent.

In these two particulars we have made good financial progress, but in spite of these important gains, and with all the retrenchments to be carried into effect in October, we find that without a decided increase in our paying class, or some unforeseen good fortune, our next year's income will still fall short of our expenses by several thousand dollars. We are hoping for an increased class, but the small number (some thirty) passed at the recent examinations is not exhilarating.

The third condition upon which Dr. Rogers resumed the presidency was happily solved by the appointment of Professor John M. Ordway as chairman of the Faculty; but the first condition—that of finding a suitable successor—was not easily met. Most fortunately, however, the attention of President Rogers and his colleagues was turned towards General Francis A. Walker, Professor of Political Economy in the Sheffield Scientific School and Superintendent of the Ninth and Tenth Censuses of the United States. The presidency of the Institute was offered to him in a letter of President Rogers's dated June 12, 1880, but, owing to his duties with the Census, he could not accept the office until 1881; and the assassination of President Garfield then made his presence at Washington so imperative that he did not assume his duties at the Institute until the first of November of that year. Ten days later Professor Rogers formally introduced his successor at a meeting of the Society of Arts, saying of him:—

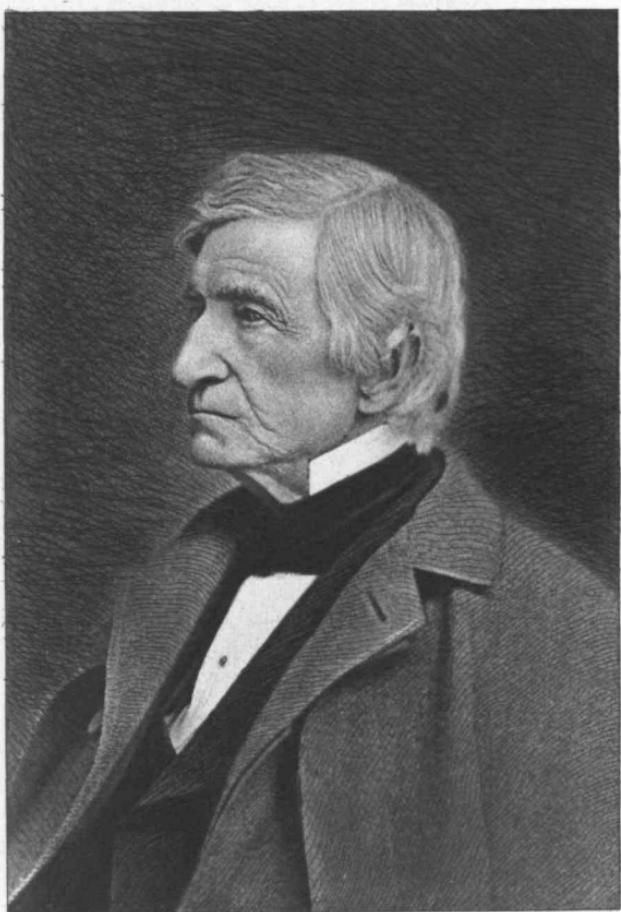
In making that introduction, personally, of President Francis A. Walker, I must say I do so in the fullest confidence, not only in his capacity for carrying out the hopes and purposes of this school,

but of the hearty sympathy and earnest regard which he entertains for its past history and for its future development. I trust in him as I would trust in myself were I of his years and had I his experience in administrative work; and in saying this I say all that any man can say in reference to his successor. I commend him to you, knowing what are his sympathies and what are his capacities of usefulness; and I commend you to him, knowing you for these many years as my friends, personally, and as the friends of this Institute of Technology.

To this felicitous introduction President Walker replied in part:—

I cannot, I do not even presume to hope that I can, fill President Rogers's place here. . . . A recognized Master in every department of physical science, and gifted with rare eloquence and powers of statement, it has been for many years his easy and pleasant task to give an appropriate and agreeable introduction to every paper offered to the Society, to join in the discussion of any topic, however abstruse, and to sum up the facts and arguments offered, in a thoroughly judicial spirit, and with the full advantage of the ripe results of modern researches. . . . I know, therefore, that the Society will feel painfully, and will long continue to feel painfully, the loss of a President who could both preside and lead,—a man fitted to instruct anybody, however learned, whose suggestions and briefest comments have always been an inspiration in the pursuit and discovery of truth, and who, as President of the National Academy, to-day illustrates and honours American science as no other man could.

Once again, six months later, those two extraordinary men stood together, and for the last time, upon a public platform. In the interval, relieved from the cares of office, Dr. Rogers had renewed his geological studies, and in April, 1882, had attended a session of the National Academy at Washington, afterwards visiting the Luray Caverns in Vir-



William B. Rogers

ginia. He returned in time for the graduating exercises of the class of 1882, which were held, as usual, in Huntington Hall, and were of the simple character originally prescribed by him. The hall was crowded with friends of the graduates and of the Institute. The abstracts of theses were listened to with the patience characteristic of such an audience, which looked for its reward in hearing the two Presidents address the young men. The younger President spoke but few words, mainly in eulogy of Dr. Rogers. Those dozen sentences, however, were charged with such true feeling, such genuine emotion, such reverence of tone and manner, that the bare transcript, even had it been preserved, would give but a faint impression of their profound effect. That President Rogers was deeply stirred by them was plain as he arose to reply. "His voice," to use General Walker's own account of the splendid tragedy,—

was at first weak and faltering, but, as was his wont, he gathered inspiration from his theme, and for the moment his voice rang out in its full volume and those well-remembered, most thrilling tones. Then, of a sudden, there was silence in the midst of speech; that stately figure suddenly drooped, the fire died out of that eye ever so quick to kindle at noble thoughts, and, before one of his attentive listeners had time to suspect the cause, he fell to the platform instantly dead.

In the hall which was the heart of this great enterprise of his, President Rogers died, in the very act of service, after twenty-three years of unflagging devotion. In that hall, under the loving guard of the class of 1882, he lay until the 2d of June. From that hall on that day, after a service conducted by Rev. George E. Ellis, and in which Rev. S. K. Lothrop and Colonel Theodore Lyman took part, his body was carried to Mount Auburn. But in that hall, in the

buildings, in the whole atmosphere of Technology, his soul remained and still abides, animating its work with his high aims, his rare devotion, his singleness of purpose, his strong, courageous faith in the great and enduring future of the Institute.

In the two years preceding his death the monetary situation had so improved, the need for men educated in applied science had so increased, and the fame of the Institute had so extended that President Rogers lived to see the actual fruition of his long and strenuous exertions. He saw the numbers augmenting, the courses of study strengthening, the leadership in the hands of a President with youth and physical vigor to sustain him, with wide and varied experience to tutor him, with an absolute belief in the high possibilities of the Institute of Technology to lead him on. Discouraged as Professor Rogers must often have been between 1860 and 1880, he doubtless never wholly lost faith that ultimately the complete Institute of Technology, as he foresaw it, would be realized. But only during those last two years of his life could he have felt absolutely certain of the carrying out of his splendid project along the lines laid down by him, and with steadily increasing impetus from that "Technology spirit" which had come from him.

William Barton Rogers was greater than most other great men in that his work was distinctively creative. He possessed that rarest combination in the nature of a man,—the ability to see visions and the power to make those visions real. His fervent and exuberant imagination, which in speech flowered into an exquisite but always sterling rhetoric, empowered him to foresee an industrial situation that was incomprehensible to the mass of his contemporaries. His wide experience and sound sense in teaching rendered it easy for him to evolve the kind of education needed to

meet that future condition. His integrity of thought and moral courage made him ready, indeed eager, to attack any ancient educational fallacy which might stand in the way of that new and necessary kind of instruction. His vitality, which no illness could weaken or daunt, almost literally drove him to do battle for his cherished ideals. Finally, his high breeding, his courtesy, his tact and his eloquence enabled him to carry on that warfare against educational error without unpleasant controversy or personal quarrels.

President Rogers ranked, and always will rank, high among geologists. Not only did he make important discoveries and present weighty hypotheses in that science, but he also demonstrated, as few men else had done, the economic value of all sound geological research. In physics, too, and in chemistry, he was a clear expositor, a brilliant demonstrator, and a notable investigator. As a keen follower of all the paths of scientific investigation, he was among the last of the Baconians, of those, that is, who took all nature to be their province. And, like Bacon, he found "no pleasure comparable to the standing upon the vantage-ground of truth." In literature, in politics, in what we now call sociology, Professor Rogers had not only wide knowledge, but also that sure view and that sane grasp of essentials which come from a genuine and thorough training in scientific method.

These things alone would have made him a marked man in his generation. What, however, lifted his work and his reputation to a far higher plane was his leadership—at a time when a leader was indispensable—in the development of higher education. To say that he created an important school of applied science, to point out that his conception of such a school is sound and vital forty years after he promul-

gated it, to demonstrate that he first established teaching laboratories of physics from which have grown similar laboratories for students of the other sciences,—to say all this is to claim but an insignificant fraction of what he did for education. His greater service was in showing that the laboratory method is the basic means of all true teaching, and in forcing the colleges, the high schools, the whole teaching hierarchy slowly to accept this truth. The change has come about so gradually as to make it hard to realize that, whether in the primary school or in the university, the attitude of the teacher towards his pupil, of the pupil towards his work, of the public towards the means and ends of education, is enormously different from that of forty years ago. Then education was receptive, to-day it is creative; then the pupil was to be instructed, to-day he is to be developed; then the important element was the lesson learned, to-day it is the student learning. What the seers in education had been vainly preaching for centuries is meeting general acceptance only in the last fifty years. That this right view is so rapidly prevailing is because of the development, in the broad meaning of the term, of the teaching laboratory.

That the growth of laboratory teaching or that the evolution of modern school and college methods was due solely to Professor Rogers, none for a moment would maintain. But in planning, establishing and carrying forward, against every obstacle and difficulty, an institution of college rank based upon the laboratory idea, he set a new standard for all the colleges; and those colleges, in turn, have placed new conceptions of teaching and new ends of education before all the schools. More than this, President Rogers so planned his School of Industrial Science that it should be, as General Walker afterwards so well expressed it, "a place for men to work, not for boys to play." This gave a new dignity

WILLIAM BARTON ROGERS, LL.D.
FOUNDER AND FIRST PRESIDENT OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. W.B.R.
DIED MAY 13, 1832. AET. 73.



THIS TABLET
ERECTED
TO HIS
MEMORY
BY THE
STUDENTS
OF THE
INSTITUTE.

CLASSES OF
'82, '83, '84, '85,
AND '86.

1882.

to college life and a new power—the ability to take life seriously—to the undergraduate. In laying out his courses of study, furthermore, he established a system of diversified yet restrained choice of study which stands in effective contrast to that “latitude of election” which is making havoc with the training of so many undergraduates. And, as his busy, many-sided life stood as an example of real breadth and useful culture, so his Institute represents and, as his plans are matured, will more and more exemplify, a practical training based upon a real education, an ability to earn a generous living founded upon that breadth of view which comprehends the supreme blessedness of fruitful, hard work.

No public monument to William Barton Rogers stands in the city of Boston. Possibly none will ever be erected there. No such static memorial could adequately represent such a dynamic force as he. Yet, a century after his birth, more than twenty years after his death, the force of his life is more potent and more far-reaching every day. Above all is it vigorous in the institution which was his crowning labor. The methods of work, the principles of teaching, the framework of the courses of study, still are his. The eager spirit of work, the devotion to truth, the hate of humbug and veneer, all are inherited from him. But as the wealth, resourcefulness and industrial capacity of the United States have gone beyond what even a seer like Rogers could have conceived, so the Institute of Technology, since his death, has advanced, in numbers, diversity of work, and educational power, beyond what his glowing vision would have been able at that time to paint. Yet the full measure of his plan for the Institute is still far from being filled. On the personal side there remains much to be done in the real, individual education of the students. On the scientific side

there is much still lacking in range of study and in depth of research. On what one may call the democratic side there is opportunity for a far wider employment of the Institute's resources. On the culture side there are many things that Technology men can learn as well as teach. Only as they appreciate this opportunity and strive to meet it will those who have benefited by his foundation make themselves worthy of the Institute's Founder. Only as they seek in every way to make the School of Industrial Science what William Barton Rogers aimed to have it become, will they be true to the trust which, dying in the very act of service, he placed in their hands.

JAMES P. MUNROE, '82.

EXTRACT FROM ADDRESS OF JOHN R. FREE-
MAN* AT THE INAUGURATION OF PRESI-
DENT CHARLES S. HOWE, CASE SCHOOL
OF APPLIED SCIENCE, CLEVELAND, OHIO,
MAY 11, 1904

A PLEA FOR BREADTH OF CULTURE IN THE SCHOOL OF APPLIED
SCIENCE

The other speakers to-day are presidents of colleges, educators of wide experience and national reputation, and it savors of rashness for me in their presence to venture opinions upon the aims and methods of a technical school; but during my twenty-five years of taking on one or more technical graduates in almost every year, and trying through them to keep in touch with the schools, I have so often found what has seemed to me a misapprehension among students, friends, and patrons of technical schools that to an audience of friends and patrons a few words from the standpoint of a business man and practising engineer may have some interest.

Why do we not find the greatest prizes of the industrial works and of civic administration going *more* often to the technical graduate? The commercial department pays a better salary than the engineering department. We have all seen plenty of examples to prove that technical training is of itself an aid rather than a bar to commercial success.

Have our men got too narrow a training in the technical school?

Within the past week I have chanced to hear two heads of concerns employing many scientific men say, in substance, that the old academic education fits better for the position where one deals with men or for the \$10,000 position, while the technical school fits better for the position that deals with materials or the \$4,000 position; and I note that sons of my old classmates are being sent first

* Vice-President American Society Mechanical Engineers, speaking on behalf of the Engineering Societies.

to Harvard or Yale or Dartmouth for *four* years, and then to Technology for a *two* years' course in science.

Six years' time—from seventeen to twenty-three—is more than the average young man can afford to spend at school. It brings him into the works too late. When we more fully appreciate that education rather than information is the true aim of the technical school, then a broad education and sufficient information can both be given in a four years' course.

Can we not give a better education to the great majority of our students, and plant in them thirst for information by doing fewer things more profoundly and putting more emphasis on the personal element?

Is not the one great captain of science or industry, like Pasteur, Kelvin, Ericsson, Bessemer, Westinghouse, Brush, Mills, or Alex. Brown, and a hundred others, worth more to his country and his neighborhood than a roomfull of the very necessary and useful sergeants and corporals of science and industry?

Cannot our school do the most good and best serve all, and best stimulate the ambition of all, by trying to fit men for the position of captain; and, if the man skilled in the application of science has also executive skill and such knowledge of men that he can negotiate, convince, and arouse men, will not he have a wider opportunity to do good and to advance the state of the art and the public welfare, and shall we not by addressing our teaching to the highest grade thus produce more of the \$10,000 men and at the same time better \$4,000 men?

In separating students into many courses, is there not danger of splitting things too fine? Have the schools not already gone too far in specializing for the undergraduate?

It is a matter of slight importance to the builder of machines or of water works whether he takes the course in mechanical engineering, civil engineering, or general physics, *if he is fortunate in his teacher.*

The chief function of the technical school is not the filling of man's memory with formulas and with knowledge of how everything is made, but rather is the training in methods of thoughtful research,

of teaching how to put the question, and where and how to find the answer, of how to set traps for our own unconscious errors, how to save time by understanding just what degree of precision is necessary to the case in hand, how to measure with certainty the limits of the ever-present error, and, above all, to develop and strengthen a warm, enthusiastic, undeviating love for the truth.

In my own college days I did not have it made plain, and I failed to grasp the fact, that perhaps the greatest opportunity of college life is that of coming to better know one's fellow-men; and it is in failure to appreciate this that the professional school has failed in comparison with the older colleges more than in any other one feature. In the protest against the old education, exemplified in the early development of the Massachusetts Institute of Technology and other similar schools, the pendulum swung beyond the centre, and the value of the social idea was for a time not appreciated, and to many of us there was lost the inspiration and broadening, the deeper understanding of humanity, that may come from entering into the daily life of the ancient civilizations enough to understand that human nature is much the same through three thousand years, or that focussing and sharpening of the wits which comes from taking time for the discussion of current events with our fellows.

We had a professor who wisely read to his class those verses on the Deacon's Masterpiece "that was built in such a logical way" as typifying the ideal machine. "McAndrews' Hymn" may teach a deeper lesson. The man should be led to find inspiration in his machinery while in the technical school.

A few weeks ago, in Chicago, I sat beside a classmate, a former "grind," now a successful man of business, at a gathering of the graduates of one of our largest technical schools. Said he, "We were brought up wrong in being taught to spend so much time on our studies: we practised a false economy in being too thrifty in our earlier years." We were too late in learning that opportunity, sustaining power, and a stimulus toward success come more from a wise good fellowship than from high scholarship, and that the art of being what in your terse Western phrase is called "a good mixer"

was an art well worth time, money, and paternal advice to cultivate. It is by giving the technical graduate a wise start in this direction that he will ultimately come more often into the larger opportunity and the higher salary of the commercial end.

This social feature is, in the final analysis, the chief value of the engineering societies. Although papers are presented in which one engineer so presents his experience that a hundred others each may find his own course more clear in attacking a similar problem, and although one may hear presented in an evening hour the results of experiments and research that have cost a year of toil, all so summed up in a few lines of formulas or constants, that a repetition of this labor and expense is saved to all who follow, and although the master mind may publish in the Transactions a study upon difficult and disputed points that will lighten labor or save mistakes to many of his fellows, after all, the pre-eminent usefulness of the Society of Engineers is in the bringing of men into personal relation, inspiring the young man by personal contact with the man who has done things, giving the older men a chance to size up the growing young men, and, among equals, it removes the bitterness to personally know our successful competitor, and to know that he is a good, honest man.

If it be asked what suggestions a practising engineer, who has for twenty-five years enjoyed taking "green graduates," and trying to help them on their post-graduate course, has to offer to his friend, the teacher, I venture the following:—

Dwell on the principles of research, fill the student mind with a comprehension that the school is not so much for filling his memory with information as for teaching the scientific method.

Give more attention to the principles of writing reports in clear, exact, and vigorous English, of measuring the exact meaning into every sentence. Teach what may be called "commercial rhetoric," bringing the result quickly into the view of the busy man, and seeking so to arouse his interest in the opening paragraphs that he will continue reading instead of laying it aside for the leisure hours that may never come.

Emphasize the need in the practical world of "getting there" on time.

Recognize that a judicious "cramming for examination" is legitimate, and that how to do it with the least internal friction is a most worthy subject of instruction. In closing business contracts and in expert work, it is a much practised and most useful art.

Direct attention to the conditions necessary for obtaining a maximum output from the human machine. How seldom a man will give to his own body the same care he would give to that of a \$1,000 horse! Long hours under stress in emergency are easy if the man knows how to avoid fatigue through variety, and has the will power to practise what he knows.

Cultivate keeping constantly in mind the margin of uncertainty in estimates in hand.

Probably there is no better way to save time and cultivate judgment than by practice in quick estimates between limits. What does that stone weigh? Not more than six tons, not less than four. What will that casting cost? Not less than \$50, not more than \$100. If the owner asks the cost of repairing the tangled smash-up of ten minutes ago, the young engineer can give him almost instantly an estimate that may serve his purpose, and be correct, if he states it between limits, as "not more than ten thousand dollars, and not less than one thousand." Twenty-four hours later he may be able to state it as not more than five thousand and not less than four thousand.

Urge upon your colleagues the fact that they owe a duty to their fellow-citizens, and to the loyal intelligent public that supports the school, to promptly and continually translate the story of the latest discovery of abstruse science down to the understanding of the well-educated non-technical man.

Stimulate the interest of the students by continually bringing before them the results of the latest research and of what is being found out in other departments of the school.

Recognize the fact that these four years of time, with their attendant expense, are too valuable to be devoted to the attainment of mere manual dexterity. This can be more cheaply learned in the field or workshop than in the school. Do not shrink from turning out graduates who will be strong on theory, while perhaps weak on

practice. They can get their practice outside after graduation, and perhaps under the quickening influence of some short-lived ridicule by the routine workman. The sound foundation of mathematics, the facility in handling and transforming difficult equations, the mental grasp of difficult considerations so as to state them in the language of mathematics and quantity, must be acquired in the technical school, or the chances are they will never be acquired.

Finally, to the many students here, I can bring back no better word from out the years since I left similar pleasant places than to remind you how largely the success of a school depends on atmosphere, that every man has a share in forming public opinion, and to urge you to fill the student atmosphere with the fraternal spirit and with ideality,—ideality, with the love of thoroughness and with reverence for character.



Frederic Field Bullard

FREDERIC FIELD BULLARD

BULLARD: THE MAN

It has been my fortune to have had for friends at least four men who died young. I might, indeed, call this my good fortune; for now, after the sadness and pain of their tragedies have passed away, the lesson of their lives shines so brightly as to inspire all who knew them. They did not flicker and burn low at the end: their lives were suddenly blown out,—so suddenly, so unexpectedly, that, after all was over, there still remained a vivid image of their characters that shall long endure. They were all strong young men. It seemed impossible that they should die; and even now it seems impossible that they are dead.

“It is better to wear out than to rust out” is a common enough saying; but we scarcely know what it means until we have seen such activities cease. Especially is it so when we regard the life of a creator of beautiful things. So high is its striving, so noble its failures, so seemingly accidental its successes, that the artist can seldom place himself with a just appreciation for his talents. It is given him, in a more obvious way, perhaps, than to others, in a more striking degree as to his audience, to do his best, incessantly, and, while the fire endures, to battle for his ideals. His work is original, initiative, it is an exponent of himself; and for this reason his life becomes of public interest.

Of these young men I knew, one was an architect, one an author, and one a musical composer. Not one of them, I know, ever touched his ideal; each was, even as he died, longing to give out a still higher, more vibrant note of power. Such is the artistic temperament, the artistic life. One travails and brings forth, and conceives again. It is a life of alternate arid barrenness and fertility. It is a life where work becomes play and pain becomes pleasure, where one is coqueted by Inspiration and lured by

Hope. No artist, I think, dares attempt to point to any focus of pleasure. Does it lie in the striving or in the achievement? Is it rewarded by the stimulating moment of completion or the vague unrest of burning desire? He cannot tell. It is given him only to produce; and, like Virtue, Art is, by a divine mystery, its own and only reward.

Surely, the gods must have it that any one who hopes for fame must write in his own blood. This is the price of immortality in Art. Nothing less will satisfy the *dæmon* who possesses the creator. Some, indeed, fear this terrible sacrifice, and their names, like their works, are writ in water. Some attempt a pusillanimous compromise, trying to cheat the Muses, diluting their ruddy ink, pricking a vein, perhaps, but using the precious fluid with frugality to make it last. But the son of heaven makes no such puerile bargain with Fate. He boldly opens an artery, and from this virile throbbing fountain he writes till the last drop ebbs.

Such a character had Frederic Field Bullard. No man, perhaps, ever more literally worked himself to death. No man ever more greatly scorned to spare his fire, no man ever shared himself more utterly with his friends. No final, critical estimate of his published work can matter beside the fact that he did his unremitting best; that, while he could, he poured out his whole exultant life into melody and harmony. His energy, at times, was Titanic. Always at the disposition, one might say at the mercy, of his friends, dispensing an extravagant hospitality, he often, during his most strenuous years, sat up to entertain his guests till two o'clock at night, and was at his desk at eight next morning to finish some compelling work. The parable of the talents was written for such men, and he took its lesson to heart. I write of Fred Bullard, the man, making no estimate of his genius; but it is well to remember that they who put their shoulders to rocks too great to move may exert as great an energy as they who roll the lesser boulder.

The thoroughbred race-horse will run till he drops dead. Bullard was a thoroughbred in every quivering, joyous inch of his body. He ran his breathless race for everything that was in him: it was

not his fault if he never reached the goal he had set for himself. His manly heart broke half-way, but he died almost with enthusiasm. What kindly, sweet, and richly dowered old age he might have known, what wisdom and what abounding charity, we can all imagine; but the stirring scene his death was has given his character the golden touch of romance that shall always heighten our remembrance of him. Like one who dies lustily in battle, his youth has, for us, achieved immortality. No vision of a broken, hampered endeavor shall ever haunt us. We have Fred Bullard with us forever now, young, ardent, impulsive, generous, frank, jubilant. And what Kipling wrote of his friend Balestier might well be set upon Bullard's grave. He was a man of

“Simplicity and gentleness and honour and clean mirth.”

But it is not enough for me to write an elegy couched in merely generous terms, for there are many who have, in a greater or less degree, this lovability. I should paint Fred Bullard with shadows as well as high lights, if I wish to impress his personality upon those who have never met him, and who will ask me, “What was he like?” Yet it is hard to cut the figure out from its background. No tribute, however just, could help being a panegyric; for it was precisely by these very primitive virtues of energy, magnanimity, courage, affection, and mirth that we knew him best! Faults he must have had, for he was human; but I know of no habit that I would dare call even by this charming name. Faults he must have had, for he made friends—and enemies, too, I hope. But I never knew him wilfully to hurt another's feelings; and what can a fault be but this? He would laugh at me, no doubt, for he knew his own weakness. Robert Louis Stevenson, foreseeing the inevitable biography that was to come, once said, “I hope they won't make me out a damned angel!” Fred Bullard might have said the same thing with equal emphasis.

I have tried to tell why we loved him; but why did we like him? Why did he interest us? How was his fellowship dramatic and poetic? Our love we can scarcely hope to pass on to another generation; but our interest should awaken the fancy of those who will

know him, else, only as a fading tradition. I confess that I shrink from the portrayal—this task, so nearly a duty—of making him live again on paper for others; and yet, if I cannot do this, the fulsomeness of my praise is of slight avail. The task is the easier, however, because Bullard had a double fascination for his comrades, an extrinsic as well as an intrinsic charm. Bullard's native manhood and Bullard's wide-spread name combined to make him a figure amongst men.

First, then, he was a man with a personality. He had the dynamic power of radiance: his soul emitted light and force. One saw that at a glance. One knew him, moreover, at sight, and one's eye picked him out from the crowd and treasured the memory. He had a distinction of manner that, though he counted it as a misfortune, endowed him with character. The slight irregularity of his physical development was not altogether a disadvantage in his companionship, in that he was not unpleasantly recognized and recalled. This peculiarity his mirthful face and twinkling eye abetted. One knew him, first, for a merry man, an optimist, a helper, with the happiness of sunshine about him. Perhaps his wit was his most striking quality, enlivening the most serious thought without eclipsing it. He had that most rare and charming power of mental adaptation and adjustment which flits without offence or shock from intelligent illumination to jocose badinage.

This was evidenced most piquantly, I think, in the contrast between his noble spirituality and his human, rollicking *joie de vivre*. A man must be wise to embrace such extremes,—to be, in a better sense, religious, and at the same time to preserve his sense of humor to flash upon life as it is lived. He must be, in a metaphysical sense, "old" to rejoice alike in archery, fishing, hunting, and fireworks, while perceiving clearly the relative importance of things. In this I use the words "age" and "wisdom" advisedly, for there is a world-wisdom and a state of immaturity which puts by such simple joys of existence, and tiptoes for superiority. Fred Bullard retained the best part of his childhood, and would, no doubt, have retained it as long as he lived. He was sane and clean.

Yet he was a man amongst men. No one ever rejoiced more in a "man-talk"; no one had a finer, truer sympathy with women; no one ever was more patient and interested in children. He had delicacy and strength: his soul invited confidence.

He made friends, too, with his own hands. We, who have received a scientific education, who have handled things and prevailed over them, do not always realize how much this experience makes for sanity and joy. Bullard knew tools, and loved them. As a chemist, as a musician, as an amateur carpenter, he played, as he worked, with his whole heart. I have known of his leaving his composition to spend a day upon the invention of grotesque duck-feet to aid him in swimming, to absorb himself in the contrivance of a cherry-seeder, to carve decoy ducks, to manufacture chests of drawers, targets, bows, and a score of other more or less foolish pursuits. It was the outlet for his magnificent energy. Force flowed from his fingers as well as from his brain.

His talk was droll and pointed with wit. With literary ability of no mean order, his conversation was often pithily epigrammatic, as often scholastically erudite. He played with words as he played with music and with tools, yet he could work with words as wisely. We who have heard him in council know that compromise was not in him; yet, differing with his opponents, he could be fair and just.

Next, his musical feeling and his natural demand for expression were in evidence. His love of song was never far below the surface. In his eyes or in his beating finger, so often as to stamp him with a manner, one noticed the evidence of creative art.

His associates, while he was in his prime, were such men as Richard Hovey, Bliss Carman, Ralph Adams Cram, and that little coterie of artists who, first as "The Visionists" and afterward as the "Pewter Mugs," contributed what was most joyous to life in Boston in the 1890's. With these Bullard, in virtue of his character as well as of his talent, was a boon comrade. He was of that "Vagabondia" which gave to the town a new prestige, and he contributed not a little to that little frenzied burst of youth which was

embodied in "Chap Book" times. Bullard's house was a centre for the elect of this enthusiastic movement. Marking its end, let me present one picture I love to recall. Two o'clock in the morning,—the "Kavanagh," in black cape coat and slouch hat, rapping at Bullard's Pinckney Street house, to tell of his sad errand,—the escorting of Richard Hovey's body to its burial-place in North Andover. Somehow, to me it is a scene out of a book; for Hovey was one of the most picturesque figures Boston has known,—and one must remember Bullard's love and sympathy for him.

There is, so often as to make one almost expect it, a compensation in poverty that ennobles the poor in purse with a richness of heart. The rich are seldom truly generous: it is of those who fight the wolf at the door that we say, "He would share his last crust with a friend—or an enemy!" Bullard was of this high caste: his generosity was a dominant trait. Half his lessons, half his strength, were given to young musicians without receiving pay. He never dunned for a bill,—one must know musicians to appreciate all this. Patience and charity he had beyond all measure; but I have never seen him or heard of him when he was not giving his time, his money, his energy, or his sympathy.

Frederic Field Bullard was born in Boston, Sept. 21, 1864, and died at the age of thirty-nine. While an infant, probably through the negligence of a nurse, he met with an accident which resulted in a disease of the spine. This was rapidly developing a marked curvature when it was arrested, happily, by a fall; for, breaking a ligament in his back, the spine buttressed so as to prevent a greater deformity. He was forced to wear throughout his childhood, nevertheless, a leather corset.

Mrs. William Ripley Nichols, a near neighbor of the Bullards', who knew him through his childhood, thus writes of him:—

Fred has always been dear to us. I remember so well the first time I saw him, a little boy of about three, climbing up the steps of his new home, in a white dress. Then his serene cheerfulness all the long months when he was strapped to his cot,—how happy he was with books and slate! Then his keen, inquiring mind, his activity! In all the years since, I have

followed him with interest, and now the last years have brought him nearer because of his songs and his hymn tunes. . . . But the beautiful spirit, the indomitable will, was here still. I have never known so joyous a nature.

No Tech man needs to be told how touching is this tribute from one who saw "Billy Rip" live and struggle with disease and weakness. He also died at thirty-nine, full of plans and schemes for the future, and, while he had accomplished much to other eyes, yet having, in his own, only just begun to live and serve.

After some private tuition, Bullard entered the Boston Latin School, from which he was graduated in 1883. He took the entrance examinations to Harvard, with honors in French, but decided, at his father's request, to go to Tech instead, where he spent two years as a special student in chemistry.

He left college to go to work as chemist, being employed in two different dye-works with no great success. Then, borrowing the money for his musical education, he went in 1888 to Munich, where he became one of the six pupils of Rheinberger, the organ master. He had long developed a taste for music, and had composed waltzes and other musical numbers even while in the Latin School. He returned to New York to receive a prize at the Academy of Music for a string suite in 1892. For the next four years Bullard was engaged in teaching, composition, and organ and chorus work. His attempts to publish his compositions by himself met with little success. Afterward, brought out with the imprint of well-known music firms, they became gradually better known, until in the last few years he derived a revenue that was, for such work, large, though never sufficient to support him.

He was married in 1896 to Maud Sanderson, who had herself attended the Tech as a special student. In 1898 a son, Theodore Vail Bullard, was born. From this time on his success as a composer was assured, and his songs sold well, but the next few years were, nevertheless, a period of tremendous energy necessary to pay his increasing expenses. Although he did not suffer, except at rare intervals, from his spine, he was the continual victim of over-exhaustion incurred by the never-ending struggle at his desk. A

large part of his work consisted in the editing of songs and song-books, and in this he held the first rank. As a teacher of harmony and counterpoint and as a critic, he could easily have occupied a chair of music in any college.

In February, 1898, Bullard wrote the "Stein Song" which has done the most of any of his compositions to insure his popular fame. Bullard himself never cared much for this effusion. He feared the effect upon his reputation of its catchy nature, and was at the time much more interested in one of Hovey's songs which he was then setting to music. As the "Stein Song" passed from lip to lip, it became, in a way, Bullard's *bête noire*. He was constantly hoping to supersede it by something more technically "musical." But, of all his songs, it will probably endure the longest, for the air and words are so perfectly wedded, and its spirit so jubilant, that it can never become either hackneyed or forgotten. Of it Bullard used to say, "I didn't write it,—God wrote it!" so fortuitous did its popularity seem to him. He resigned himself to the "tag" this song put upon him, however, for the people's fancy is not easily caught, and is not easily defied. By that song Bullard is known, and always will be, though he has left far better work behind. It was a happy occurrence for him, at the last, to hear its ringing cadences voiced by a thousand of his college mates. Its strains came back to him then, I think, as music, almost for the first time, and the draught was sweet enough to make him forget what the "Stein Song" had always stood for him,—a yearning to do something better, a revolt against the superficial judgment of the crowd. We did more for him than we knew when we raised him to our shoulders that night at the "Pop" concert. It made death easier for him, healing him of his hope deferred.

Of his work for the Tech it is scarcely necessary to speak, so recent is his influence and so deep was his impression upon the life of the school.

He went night after night to the Tech Union, which he ruled with a merry, waggish despotism. While it lives, it will be influenced by the precedents he established. At its meetings, despite

the difficulties of initiating such a fellowship, all will remember him as cordial, inspiring, eager, jovial,—a mental and moral dynamo. This service, though it was willingly and happily given, drained his strength. But he did much to bring in the true *Kommers* spirit of comradeship to his Alma Mater: he established traditions of fraternity and loyalty; and, giving freely, he received, I think, as freely the love and devotion of the undergraduate body. He was the President's most able assistant in his courageous and happy plan of increasing our *esprit de corps*.

Bullard endowed his college also with its first song-book, presenting it with many valuable pieces of his own, collecting, editing, and arranging material with as much care as if it had been a book of his own. This task, like the other, was made a pleasure to him by the friendly co-operation and the broad views of President Pritchett, for whom Bullard had always the highest admiration and the most earnest friendship.

Lastly came the Tech Reunion. I scarcely dare trust myself to speak of the sacrifice Bullard made to make his share of the event the success that it was. I have seen his light burning across the orchard till all hours of the night, I have seen Bullard's pale face haggard with loss of sleep, I have stood in line in the crowd with him, and felt his body tremble with weakness and seen the beads of sweat stand on his forehead; but I never saw him let up for an instant the ardor of his endeavor. He spent himself, regardless of the consequences; and he paid the price. He was at the time under contract to deliver the edited copy for a work on the reed organ by the tenth day of July. It was a task so full of painstaking details, and incurring so much investigation, collection, and explanation, that the effort to get it done in time constantly harassed him. Yet all this he let go, that the reunion should receive the best that was in him. He wrote a march for the occasion, arranged the orchestration of all the numbers, attended rehearsals, and in odd moments of his time, plodded at his legitimate work. The consequence, we all know, was a collapse from which he had not vitality to recover. The organ-book was not only not finished, but the whole of his work spent on it went for almost nothing, in view of the necessity of engaging a new compiler.

If Fred Bullard's memorial never exists except in the hearts of his friends and college mates, it will be enough; but no Tech man, I think, better deserved a more tangible testimony. Be that as it may, he has himself woven a thread of song that shall bind him to us and to his Alma Mater forever. So raise Fred Bullard shoulder high again, fellows, and show him to the world! And, thrilling to the spell of his bâton,

"Give a rouse, then, in the Maytime,
For the heart that knows no fear!"

GELETT BURGESS, '87.

BULLARD: THE MUSICIAN

He who has known a man of genius only in the midst of his career, who has become familiar with him only when his powers were well developed or beyond maturity, who has not seen him as a youth, in his first moments of his consciousness of inspiration, will never have a complete and natural conception of him, the only living conception.—*Sainte-Beuve*.

As the above words were written when the great critic was nearing his sixtieth birthday, in an essay in which, for the first time in his life, he was making an exposition of his own methods, they may well be taken as substantially true, though representing merely one person's opinion. At this moment they seem to me to be very true, for I realize to what extent my judgment of Fred Bullard's work is based upon the knowledge gained in intimate association during the formative years.

Emboldened by this knowledge, and relying on the good will of a friendly Tech constituency, I leap at once to a statement which, before another audience, would need the support of elaborate exposition and argument: Fred Bullard was a genius. I choose the word with care, setting him above men of talent. I dare not say "a great genius," because he worked generally in the smaller forms, and because a final estimate of the two large works left among his manuscripts is not possible until the compositions have had adequate performance. But I am confident that the concert-giver of

the year 2000, making up a programme of a score of the best songs written by American composers who were at work in 1900, cannot justly omit a song by Frederic Field Bullard. Nay, more! Unless fundamental alterations in musical diction are made,—alterations more radical than any which have come to us since Sebastian Bach's time,—I believe that some songs of Bullard will find ultimate place among the world's collection of imperishable vocal gems, where Schubert's "Who is Sylvia?" and Schumann's "Ich grolle nicht" are already irremovably set, with perhaps a score of others.

This is a bold statement, bolder than might appear to the non-professional reader. But I believe it to be a safe one, even though experience shows that many fine things seem to get permanently pushed aside by the rush of new productions. There is, however, in part of Bullard's work a searching, winning quality of which the casual observer has no notion. Only those who have known his earlier productions with absolute thoroughness, and who have laid them away in nooks of memory which have been visited from time to time during a decade or more, will find any basis for my statements.

Bullard came justly by his love for the highest in song. As a child, he was listening in his own home to great works studied in repetition and re-repetition under the hands of accomplished performers. Song, symphony, opera, anthem, were already represented in their best phases in the home library, and copious additions were continually made, as the products of various nations established themselves in public favor. Probably no more illuminating general statement as to the home atmosphere could be made than to say that Bullard's parents were among the earliest Schumann enthusiasts in Boston, when Schumann was the daring innovator of the moment.

The boy's keen perception of melody became early apparent. I remember well his feats of reproduction of songs and chorus numbers heard at theatre or concert in the years of my earliest acquaintance with him, 1880-83. He would pass interesting numbers in review, not with the parrot-like exactitude which one often finds in persons of indifferent musical appreciation, but with a power in

getting essentials of which I do not remember to have found quite the parallel, and, let it be said incidentally, always in the "rich" keys of G-flat, D-flat, and B, which last key he always "thought" as C-flat.

He was generally busy with devices and experiments of a musical sort, though occasionally throwing himself enthusiastically into some other field,—notably, at one time that of microscopy, and, again, that of chemistry. He organized an orchestra in the Boston Latin School, and wrote a set of excellent waltzes for it,—the "B. L. S. Waltzes,"—played during our graduation year. We had a male quartet of which he was really the leader, though the other members tried their hand at occasional suggestions.

It will be remembered that about the same things were heard of him at M. I. T. There was the orchestra, and its concerts with the Glee Club. I wonder if it was at this time that the "incident" of the double-bass occurred. Probably it was the lack of that instrument in some amateur orchestra which caused him to take it up for a few months, laying aside the flute, which he played sufficiently well for orchestral purposes. One of the gayest musical evenings I ever spent was at his home during that double-bass fever, when he performed on that instrument, with exaggerated expressiveness, most of the bass recitatives and arias of Mendelssohn's "Elijah." He had never done such a thing before; and I dare say the performance was never repeated. It was only one of the pranks of an inexhaustibly deviceful mind.

Then came the period of struggle for supremacy between his genius and his desire to follow practical advice as to the selection of a life-work. Somewhere in this period falls a sonata for horn and piano, played for him at his home by the kindly and erratic Reiter, whose peer the world knows not. At length the compelling genius triumphed, as such gifts always must; and he sailed for Europe in the summer of 1888, henceforth primarily a musician, but still experiencing, as before, sporadic enthusiasms in various other directions,—for travel, for fiction, for history, for painting, for the collection of a musical library, and for perhaps a score of other things which escape my memory at the moment.

I must mention, from the days in Munich, one incident which is characteristic of his intellectual voracity. Thinking that he ought to know more of musical history and kindred things, he plunged into Grove's Dictionary of Music, a four-volume work of about three thousand double-column pages of solid brevier type, intending to read it *seriatim!* My recollection is that he kept at it for about a thousand pages, desisting after arriving at the conviction that such reading had little value for the creative musician.

Good old Rheinberger, better pedagogue than composer, knew that he had to do with a genius. He kept Bullard in his organ class, while far riper instrumentalists raged without. And with what kindly care he tried to curb the daring spirit while rounding out the young master! And what wholesale "liberative" revision some of the songs of this period experienced, when, as Opus 5 and Opus 8, they came to publication in Boston!

But I fear that I am already claiming too much space for a subject which interests me so keenly. The return to America in 1892, the feverish haste to secure an income which might obliterate heavy financial obligations, the life in the old home and in the new home, the generosity of devoted admirers and friends, the anxieties as to the near and distant future,—all these things will doubtless find treatment elsewhere; if not now, later. We need here note but one indubitable fact: Bullard grew steadily in the grace of the Muses until very recently. He left in his portfolio a goodly number of compositions which will certainly add greatly to his fame, and many more which are as clearly stamped with his personality as the majority of those which have already been published. Even out of recent months have come some noteworthy works, particularly some children's songs and some hymn settings of high excellence. There are also some translations of German and French lyrics, renderings which only a poet and a singer could have given us.

I am voicing no fatalistic theory when I say that we must not inconsolably grieve that he died, while the sense of his achievements makes us deeply rejoice that he lived. We now know that only a miracle could have restored his nerve strength. It is probable

that but a few months would have passed before there would have come to him that consciousness which is, for the creative artist, infinitely worse than death,—the consciousness of irretrievably impaired power. Fortunately, he had had no occasion to suspect it, as he had been occupied chiefly with editorial tasks for several months. He was confident that health would be fully re-established. The closing weeks of his life gave him a splendid triumph as an apostle of good fellowship at the Tech Reunion. Yet all the effort of preparation for that event—which would certainly have rent the tissues of the weakened heart, had not the technical execution been mere child's play for him—wore upon him but little. He was a bit excited that evening as he came to our home; but the joy he felt was so completely that of having done well a helpful service, not that of having scored an artistic success, that there was no undue exhilaration and no reaction. There was some weariness the next day, of course; but the following Monday, even after the trying duties of Sunday, he seemed to be thoroughly rested, and stronger in health than for several previous months.

It chanced that on that day I introduced him to one of my friends, who knew some of his works, but who had not happened to meet him personally. The friend was asking how the "Stein Song" came to be written. Bullard's reply was one which he may have made before to a similar question, but I had not heard it: "Oh, Dick Hovey loved me, and I loved Dick Hovey!"

I make bold to suggest to Tech men that the best tribute that they can render Bullard is to bear in mind his works. I append a list of those which I believe to be among his best, in the belief that the readers of these words may wish to bring them to the attention of musical friends. A suggestion somewhat like the following may well accompany any mention of them to lovers of music: "Do not lay them aside until you know them well. Then, if you can lay them aside, you may."

I mention only such as I regard as sure to find favor with any one who can adequately render them, and I italicize those which are surest to appeal speedily. A complete list would occupy about three pages of this magazine.

SONGS: *The Waterlily*; From Dreams of Thee; *The Singer*; A Prayer; The Hermit; Hymn of Pan; How Fair thou Art; *Beam from Yonder Star*; *The Indifferent Mariner*; Nottingham Hunt; *The Sword of Ferrara*; Swords out for Charlie; *There's a Woman like a Dew-drop*.

ANTHEMS: *There is no Night in Heaven*; Light and Life Immortal.

PART-SONGS: Comrade Song; Winter Song; *Come o'er the Sea*; Up, Sailor Boy, 'tis Day.

I omit the "Stein Song" from the list, not because I would put it in second rank, but because it needs no mention. There lingers in my mind an utterance of a member of the Boston Symphony Orchestra, who had heard it over and over again at the summer concerts. He asked me one evening, "Where did Mr. Bullard get the song which he arranged as the 'Stein Song'?" On being assured that it was an original composition *von Grund aus*, he exclaimed, "Why, I thought of course it was a folk-song!"

And so it is,—our first noble American folk-song; that is, the first one worthy to take rank with the crystallized racial utterances of the older nations.

LEO R. LEWIS.

TUFTS COLLEGE, MASS.

THE TECHNOLOGY FUND

Since the last issue of the REVIEW, the Executive Committee and the Income Fund Committee of the Technology Fund have held frequent and protracted meetings, and the work of organizing class and local committees, of verifying and correcting lists, of preparing and sending out literature, and of dealing with a large correspondence, has gone steadily forward. Through the courtesy of its officers this work has thus far been carried on at the Technology Club; but, with the renewed use of the club-house after the summer, the room so generously placed at the disposal of the Fund Committees is urgently needed for the members, and the headquarters of the fund have been removed to Room 44, in the Rogers Building. The Committees will continue to be addressed, however, at 83 Newbury Street.

The organization as at present effected is as follows:—

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The majority of the chairmen have formed committees, and with the close of the vacation season these committees are now beginning active work. Heretofore in only a few classes and localities has any systematic work been done. During the current week (October 9) meetings in Chicago and St. Louis are being addressed by the chairman of the Income Fund Committee, and in Boston classes are holding enthusiastic meetings for the discussion of this fund.

It is the purpose of the work to get every man to subscribe according to his means, and the pledges that have come in range from one dollar to one thousand dollars annually, the extremes being about equally infrequent. The geographical distribution is as wide, ranging from Mexico to Alaska, and from California to Maine. All

classes from '68 to '04 are responding. The total of subscriptions for five years received to October 17 is \$103,600, and a considerable number of subscriptions are undoubtedly still in the hands of class and local representatives. Had all subscriptions which have been made come in, the total would undoubtedly be close to the final figure of the Walker Memorial Fund. Yet the number of men from whom this equally large sum has come is less than one-sixth that of the Walker Memorial subscribers. The success of this movement is, therefore, assured.

The hearty response of Institute men to the appeal to come to the aid of the M. I. T. is by no means limited to graduates. A striking feature has been the prompt and liberal response of the non-graduates among the Institute's former students. These special students have not only subscribed in large numbers, but their subscriptions have averaged as large in amount as have the subscriptions of the graduates.

As indicating something of the spirit of earnest loyalty in which the men are responding to Tech's appeal, the few appended extracts from letters recently received from some of the younger men cannot fail to be of interest. There is evidence of the same spirit in all classes. Between certain of the younger classes there is developing a good-natured rivalry to see which shall make the largest subscription.

Extract from Letter of '04 Man

It is a source of keen regret to me that I can give but a small sum to the Institute. Just graduated, with college debts to pay, and no position in sight. It is, however, all that I feel able to pledge.

Amount pledged, \$10 annually.

Extract from Letter of '01 Man

At present I am in debt and carrying \$5,000 life insurance, so I don't feel that I can carry a much greater load for a starter, especially as our company has developed a very bad habit of laying us off in the winter.

Amount pledged, \$25 annually.

Extract from Letter of '03 Man

Apologizes for delay in replying, and writes:—

Because conditions with me were and are so uncertain, . . . I thought it better to wait until I could view the future more clearly, so that, when I made you a promise, there would be no question about my keeping it. . . . I have a young sister and brother whose education I am to look after, and this responsibility causes me to go a little slower financially than if I were alone. It is my desire to send my brother through the Institute.

Amount pledged, \$50 annually.

Extract from Letter of '03 Man

I am sorry that I cannot pledge more . . . Have but recently graduated. . . . "My visible means of support" are my good health, education, and current month's check, and . . . I owe M. I. T. \$100 for a Rogers Scholarship. I feel that the above pledged amount is my reasonable limit.

Amount pledged, \$25 annually.

The Endowment Fund is also making satisfactory progress; but the gathering of it is a matter requiring greater consideration and more careful preparation than that of soliciting the Income Fund from the past students of the Institute, to whom the needs and high deserving of their college are known, and who had been prepared by the Reunion to respond promptly, as they have, to a financial appeal. The work of the Income Fund Committee will be finished, it is believed, during the current academic year. That of securing the Endowment Fund will be continued for a number of years. During the period, however, in which the permanent endowment is being raised, the annual needs of the Institute will be amply provided for by the zeal and generosity of her past students. For, as plainly indicated by the progress of the Income Fund, they will undoubtedly have subscribed for her use in developing and strengthening her work during the next five years current funds so considerable as to represent the income, during that period, of a large endowment.

THE BUREAU OF STANDARDS*

This article is written for the benefit of any graduates of the Massachusetts Institute of Technology who would like advice upon the desirability of seeking a career in the scientific work of the Bureau of Standards and to spread further information in regard to this bureau than is generally known. The question has been asked as to whether there is any need for technically trained men in the work of the Bureau of Standards. If so, does it offer any peculiar opportunity for a man to attain eminence in his chosen profession, and would he be reasonably rewarded for his services? The answer to these questions may be found in a description of the bureau as it stands to-day.

The Bureau of Standards is a branch of the scientific work carried on by the government, and it has special functions which differentiate it from all other institutions, governmental or otherwise, in the western hemisphere. That it must always depend upon technically trained men to carry on its work is essential from the very nature of that work. At the present time over 50 per cent. of the *personnel* of the bureau are college graduates who have specialized in some branch of science, and the demand for more such men will increase in direct proportion to the growth of the bureau.

Since July 1, 1903, the Bureau of Standards has been a part of the Department of Commerce and Labor. Previously it had been under the Treasury Department. The custody of such standards as the government possessed was intrusted to the Treasury from the beginning, because that department was more deeply interested than any other in the matter of standards in connection with the coinage and the levying of duties. The Office of Standard Weights and Measures was raised to the dignity of a

* For the earlier papers of this series, contributed by the Washington Society of the Massachusetts Institute of Technology, see *TECHNOLOGY REVIEW*, Volumes IV. and V.

bureau by Act of Congress approved March 3, 1901, and taking effect July 1, 1901. Since that time an energetic policy has been followed. Suitable quarters had to be provided, the *personnel* largely increased, and a complete reorganization effected upon broad lines.

The bureau has a much more important trust than the mere custody of the fundamental standards. It pledges the honor of the government when it makes a comparison of the standards used in engineering, trade, and science with those of the government, and issues a certificate as to the accuracy of the former. When the government puts its seal upon a piece of metal, it is accepted at its face value without question: whereas, if money were made by private enterprise, there would be constant doubt as to the honesty of the currency. Likewise the standards of length, mass, and capacity belonging to the government command the same degree of confidence among the people. It is no less important to continually study methods for improving the accuracy of observations, and this leads oftentimes into considerations of how to improve the standards themselves. The bureau is authorized to carry on the investigations necessary to solve problems arising in connection with the standards, and to determine physical constants and the properties of materials. To compare private measures with those of the government is a matter requiring great skill and not infrequently an extensive knowledge of scientific methods.

The chief officer of the bureau is the director, who must be a physicist of distinction, and is appointed by the President. All other officers and employees are appointed by the Secretary of the Department of Commerce and Labor upon certification of eligibility by the Civil Service Commission. As the number of candidates is large and the places to be filled are few, it is evident that no one without proved ability can hope for appointment.

The staff is divided into three classes, as follows: engineering, clerical, and scientific. The engineering class is composed of the chief engineer, mechanicians, carpenters, engine and dynamo attendants, firemen, watchmen, janitors, apprentices, and laborers. The clerical class comprises the secretary of the bureau, stenog-

raphers, typewriters, auditing clerk, librarian, storekeeper, draughtsmen, and messengers. The scientific class is composed of college graduates of ripe experience in their respective lines of work. The order of rank is as follows:—

Director; physicist; chemist; associate physicists and chemists; assistant physicists and chemists; laboratory assistants and aids.

The salary attached to the above offices varies from \$5,000 to \$600, which is somewhat better than is paid in corresponding positions in the average college, but is less than the same ability often commands in the business world. The staff is not held together by money considerations so much as by the unexcelled opportunities to carry on research and to associate with men of established reputation in the world of science.

In order to obtain a position on the scientific staff, one must have a liberal training in general physics, mathematics, and refined laboratory methods. He must be able to consult foreign technical journals freely and have made a special study of some class of measuring instruments. He must have a natural aptitude for delicate experimental work. Post-graduate work leading to the degree of doctor of science or philosophy, or experience as a teacher of science, adds greatly to the qualifications of candidates. At least such an inference might be drawn from the fact that, out of the thirty college graduates on the staff, twelve have taken their doctor's degree and seventeen have been instructors or professors at different colleges. Johns Hopkins University leads the list in numbers with seven representatives, followed by the Massachusetts Institute of Technology with five. In the future new appointees will, as a rule, be first appointed in the lower grades, and will be promoted as vacancies occur.

The scientific work falls naturally into three distinct groups, as follows: general physics and engineering, electricity, and chemistry; and the work in the first two groups is carried on in minor divisions.

In the weights and measures division, comparisons are made with the national standards of length, mass, and capacity. Among the tests made are those on standard bars, tapes, limit gauges, masses

used by chemists and assayers, aneroid and mercurial barometers, hydrometers, and chemical glassware. Some of the balances used are mounted on piers in underground vaults, and are operated from an adjoining room by means of rods about fifteen feet long. A horological division for the rating of time-pieces will be established later.

The thermometry division has of late attracted considerable attention, especially among blast-furnace men and physicians. The importance of having clinical thermometers correct is apparent to every one; and improved methods and apparatus have been developed in this division to enable it to handle the thousands of thermometers which it is called upon to test, so that every piece receives as careful attention as if it were the only one under test. The standardizing of thermo-couples, electrical resistance pyrometers, optical pyrometers, and other high-temperature measuring instruments, which are of great importance to the manufacturer of iron and steel, and the determination of the specific heat and melting points of metals and minerals, come within the scope of this division. A standard gas thermometer will be constructed in the near future. The bureau owns many standard thermometers which have been carefully studied at the International Bureau of Weights and Measures in Paris.

The optical division has charge of the testing of the scales of polariscopes, quartz control plates, and accessory apparatus, which are of great importance in the levying of duties upon sugar. Much polariscope work of value is being carried on, and also extended researches in the physics of high vacua. The interferometer is used for refined measurements.

The engineering division was created for the purpose of testing various mechanical measuring instruments, such as water meters, gas meters, steam pressure gauges, speed indicators, indicator springs, and the physical properties of materials. The equipment includes a Riehlé testing machine of the latest pattern, having a capacity of 100,000 pounds. This division has recently undertaken an important investigation looking to the establishment of a national standard for fire-hose couplings.

The electrical division possesses a great variety of delicate electric and magnetic instruments of all kinds. The character of the work done will be shown at the Louisiana Purchase Exposition, where a testing laboratory has been installed in the electrical building for the purpose of making tests for the jury of awards. Among the wide variety of tests which naturally come to such a section as this may be mentioned the testing of all kinds of direct and alternating current measuring instruments, condensers, inductances, and resistance standards, the determination of the electrical conductivity and thermo-electric power of material, and their temperature coefficients, and the candle power of arc and incandescent lamps. The resistance and photometric standards are periodically compared with those of the Physikalisch-Technische Reichsanstalt. A great deal of attention has been given to the construction of primary mercurial resistance standards and the construction and properties of the standard cell and the silver volt-meter, also to the question of a standard of light.

The results obtained from the researches carried on at the bureau are published from time to time in the scientific journals and in the bulletins issued by the bureau. Every piece of apparatus submitted for test which is found within the limits of tolerance allowed is given an identification number, and a careful record of the original observations is kept on file. A nominal fee is charged for all tests except those for the national and State governments.

The need for such an institution as this is so great that it seems remarkable it was not established long ago. Since the time of Eli Whitney, who is spoken of as the father of the system of interchangeable parts, the world has been steadily moving onward toward uniformity in its standards. Germany was the first country to establish such a bureau, and the reputation of its Physikalisch-Technische Reichsanstalt is an enviable one. England has her National Physical Laboratory, doing a similar line of work in a creditable manner. That the Bureau of Standards shall be of as great service to the people of the United States is the earnest desire of those who direct its policy. It is recognized that this bureau should not only be the repository for all standards, but should

assist in bringing about order wherever commercial standards are in a chaotic condition. To make changes in existing conditions requires tact, persistence, and patience, and often involves laborious investigation. Whenever working standards which have worn out with use are replaced, the new ones should be compared with the national prototypes. As this will be an endless process, it insures the permanent usefulness of the bureau.

ALBERT S. MERRILL, 1900.

GENERAL INSTITUTE NEWS

CORPORATION NOTES

At the meeting of the Corporation on October 12 Dr. Francis H. Williams was re-elected Secretary of the Corporation, Colonel T. L. Livermore was elected a member of the Executive Committee for five years, and the other committees, with slight changes, were reappointed.

New appointments were confirmed as follows: J. A. Hare and G. J. Lenz as Instructors in Modern Languages; C. L. E. Moore as Instructor in Mathematics; S. H. Thorndike as Instructor, and Bernard Blum, A. R. Holbrook, R. G. Hartshorne, O. G. Thurlow, and E. E. Stetson as Assistants, in Civil Engineering; E. W. White as Assistant in Industrial Chemistry; N. E. Tousley and R. W. Moore as Assistants in Analytical Chemistry; G. R. Taylor and J. C. Hudgins as Assistants in Inorganic Chemistry; Raymond Haskell and R. B. Sosman as Assistants in Theoretical Chemistry; S. N. Mason as Assistant in Technical Analysis; C. H. Collester as Assistant in English; W. O. Hiller, C. S. Aldrich, M. W. Dole, and A. F. Holmes as Assistants in Mechanical Engineering; A. L. Moulton as Assistant in Woodwork and Foundry Work; M. G. Meriam as Assistant in Chipping and Filing; Albert Sauveur as Lecturer on Metallography; Robert Faulkner, Moses Brown, Jr., F. W. Horton, and R. C. Reed as Assistants in Mining Engineer-

ing and Metallurgy; H. H. Needham, W. J. Gill, and E. W. Niles as Assistants in Physics; F. A. Woods, M.D., as Lecturer in Histology and Embryology; R. D. Mailey, G. A. Abbott, and C. A. Kraus as Research Assistants in Physical Chemistry; and E. G. Smith, Research Associate, and G. C. Bunker as Research Assistant, in Sanitary Science.

THE NEW YEAR

After the extreme fluctuations in the size of the entering classes consequent on the advance of entrance requirements and the tuition fee last year, the present class of 1908 is of normal size. The regular students of the first year have numbered in the past four years as follows: 374, 440, 479, 348, and this year 380. The total number of students is 1,546, 14 more than last year. This gain is particularly gratifying in view of the advance of the tuition fee and other more or less adverse conditions.

The number of applicants entering from other colleges is more than one hundred and twenty, indicating a steady and welcome growth in this direction. Among the institutions represented are Agricultural and Mechanical College of Texas, Amherst College, Anatolia College, Beloit College, Bethany College, Boston College, Boston University, Bowdoin College, Brown University, Bryn Mawr College, Case School of Applied Science, Centenary College, Colby College, College of the Holy Cross, College of the Sacred Heart, Colorado Agricultural College, Colorado College, Colorado School of Mines, Columbia University, Cornell University, Dartmouth College, Denison University, Fairmount College, Franklin College, Franklin and Marshall College, Geneva College, Harvard College, Hiram College, Illinois College, Iowa State College, Kansas State Agricultural College, Kansas State University, Lake Forest College, Lawrence Scientific School, Massachusetts Agricultural College, Mercer University, New Mexico College of Agriculture and Mechanic Arts, Montana School of Mines, McKendree College, Northwestern University, Purdue University, Princeton University, Rhode Island College of Agriculture and Mechanic Arts, Sheffield Scientific School, St. Ignatius College, St. Johns College, Swarthmore College,

Syracuse University, Trinity College, University of Chicago, University of Illinois, University of Michigan, University of Minnesota, University of Nebraska, University of Ottawa, University of Rochester, University of Texas, University of Wisconsin, University of Wooster, United States Naval Academy, Virginia Military Institute, Washington and Jefferson College, Washington and Lee University, Williams College, Wittenberg College, Worcester Polytechnic Institute, Yale University.

The international contingent is notably large and in several respects of special interest. From China come six government students, from the Philippines four. England, Scotland, Australia, South Africa, Sweden, Armenia, and the Spanish-American countries are also represented.

The accession of the Chinese students is of special interest as representing a new governmental policy in higher education. Alumni of twenty years' standing may recall that six Chinese students entered with the class of '84, but were recalled by their government early in the course. This year China is again sending fifty of her picked youth to foreign countries, about half to Japan, a few to Europe, and fifteen to the United States, of whom six come to the Institute. All have had extended academic preparation, and one is in the second year.

Eight naval cadets are entering the course for naval constructors, making twenty students in the three years instead of the nine originally anticipated.

FACULTY NOTES

Changes in the Faculty have been exceptionally numerous, including the loss by resignation of Professors Rambeau, Baird, Dippold, Duncan, Skinner, and Norris, besides Professor Whitney, whose appointment as non-resident assistant professor of Theoretical Chemistry was referred to in the July number. Professor Sondericker died at his summer home in Wilmington, Vt., as elsewhere mentioned.

The President and Professors Cross, Wells, Peabody, Tyler, Talbot, and Duncan have spent the summer vacation wholly or

partly in Europe, while Professors Bartlett and Bardwell have returned after a year's leave of absence. The President and Professor Cross were present at the Cambridge meeting of the British Association for the Advancement of Science. Professors Tyler and Bartlett participated in the International Congress of Mathematics at Heidelberg. The President and many other members of the Faculty have had an active share in the work of the Congress of Arts and Sciences at the Louisiana Purchase Exposition, although the actual representation of the Institute at the Congress was limited. Papers were presented by Professors Richards, Sedgwick, Talbot, Noyes, Walker, and Goodwin. Professor Allen presided at the St. Louis meeting of the Society for the Promotion of Engineering Education.

Professor Tyler spent the last week in August in England, mainly for the purpose of visiting persons with whom he had had earlier correspondence with reference to sending students to the Institute. A plan of special interest in this connection has been formulated in Leicester, an important and progressive manufacturing town in central England. A committee of gentlemen interested in education has received a scholarship fund of seven hundred and fifty dollars per year for three years, to be awarded on competitive examination to a candidate prepared to enter the second year at the Institute, with the obligation of returning after graduation as a teacher in the Leicester Technical School.

The outcome of this most interesting experiment will be awaited with the greatest interest. So far as can now be anticipated, a candidate may be expected to present himself for admission to the second year on the basis of examinations arranged by the Institute in England in 1905. The Leicester School corresponds in some measure to such American institutions as the Textile School at Lowell.

Professor Davis R. Dewey took part in the centennial exercises of the University of Vermont, July 2-5, and delivered an address on the "Relations of the University to Social Science and Progress."

The month of October has been notable in Boston for the number of foreign visitors of distinction, some of them attending the Inter-

national Peace Congress, others the General Convention of the Protestant Episcopal Church.

Those most immediately interested in the Institute have visited Boston on their return from St. Louis to Europe. The Society of Chemical Industry included a considerable body of scientific men, and many of the European participants in the Congress of Arts and Science came in a body October 2 and 3. The Institute tendered them a lunch at the Technology Club on Tuesday, October 4; and members of the Faculties of Harvard and the Institute entertained the visitors at dinner at the Somerset the following day. Individual visitors have also been numerous.

The Christmas vacation will extend from December 26 to 31 inclusive.

The Faculty will arrange for a meeting commemorative of President Rogers on the one hundredth anniversary of his birth, December 7, 1904. Invitations will be limited to members of the Corporation and Instructing Staff in addition to the undergraduates.

SUMMER COURSES

The total registration for this year was 255 students as compared with 245 last year, and was distributed among the following courses: Air, Water, and Food Analysis, Analytic Geometry, Applied Mechanics, Bacteriology, Carpentry and Wood Turning, Inorganic and Analytical Chemistry, Chipping and Filing, Descriptive Geometry, Design (Architectural), Forging, French, German, Integral Calculus, Joinery and Pattern Work, Machine-tool Work, Mechanical Drawing, Mechanism, Organic Analysis, Organic Preparations and Reactions, Pattern Work, Physical Laboratory, Physics, Shades and Shadows, and Surveying.

More students from other colleges attended this year than ever before. The universities and colleges represented by those who were taking work at the Summer School were: Harvard, Princeton, Brown, Boston, Johns Hopkins, Cornell, Arcadia and Columbia Universities; the Universities of Vermont, Toronto, Georgia, and Trinity; Geneva, Bowdoin, Williams, St. Ignatius, Franklin and

Marshall, Washington and Jefferson, Wellesley, Mackensie (Brazil), Anatolia (Turkey), Colleges; Worcester Institute of Technology, Pratt Institute, and the Missouri School of Mines and Metallurgy.

DEPARTMENT NOTES

CIVIL ENGINEERING

Mr. K. S. Sweet, '93, who for a number of years has been Instructor in Civil Engineering, having charge of the stereotomy and a portion of the hydraulics, died rather suddenly on July 15. A notice of him appears elsewhere in this number.

The following graduates of the class of 1904 have been appointed assistants in the department to take the places made vacant by the retirement of the appointees of last year: B. Blum, R. G. Hartshorne, A. R. Holbrook, E. E. Stetson, O. G. Thurlow.

Applications for men have come in in considerable numbers during the summer, and the total number was well above the number of men available. Considering the dulness in general business, this is extremely satisfactory. Many of the members of the class of '04, however, have not informed the department of their whereabouts or whether they are employed, so that a great many applications for men, requiring immediate reply, have had to be answered with the statement that no available men were in sight.

Mr. S. H. Thorndike, '95, has been appointed temporarily Instructor in Civil Engineering, to fill the place made vacant by the death of Mr. Sweet. Mr. Thorndike has for some years occupied a responsible position in the office of the city engineer of Boston, and will not entirely sever his connection with that department.

MECHANICAL ENGINEERING

Inasmuch as the thesis work in this department, and also the regular laboratory work, is so planned as to include a considerable amount of investigation of engineering subjects upon a practical scale, there are always some problems of such extent and importance that, while by the work performed during one year certain

progress is made, the research is continued during one or more succeeding years. The results of such work, having been published from time to time, have in a number of cases exerted a considerable influence upon engineering practice.

Upon a subject of this nature, which is at the present time a very live question among engineers,—namely, the use and capabilities of re-enforced concrete in construction,—two theses were carried on in 1902-03, one upon beams and the other upon columns, and two more in 1903-04. Substantial progress has been made, and a part of the results have been already published both in America and in Europe. Moreover, the subject is of such importance that a joint committee has been formed from the four following societies; namely, The American Society for Testing Materials, the American Society of Civil Engineers, the Association of Cement Manufacturers, and the American Railway and Maintenance of Way Association. Professor Lanza is one of the members on the part of the first-mentioned society, and also its representative on the sub-committee on plan and scope.

Another investigation carried on in this laboratory during the year 1903-04, which is of very general interest, was made upon a Wainwright surface condenser, capable of condensing about two thousand pounds of steam per hour, for the purpose of obtaining data for condensers to be used with steam turbines where a high vacuum is desired, combined with good economy in the amount of condensing water employed. The condenser experimented upon was specially made and presented to the department for the purposes of these experiments, and, in the light of the results, the company has replaced it by a new one arranged in such a manner as to enable us to carry the investigation farther.

Another subject of very general engineering interest, upon which a thesis was carried on in 1903-04, is that of the strength of locomotive connecting rods; and in connection with this investigation, a series of eight full-size steel rods, made for the purpose by the Baldwin Locomotive Works, were tested in compression, and valuable results obtained.

A treatise on Mechanism by Professors Schwamb and Merrill,

published by John Wiley & Sons, is now in press. The following papers have been recently published by Professor Lanza:

1. A Brief Review of the Status of Testing in the United States, (Proceedings American Society for Testing Materials, 1904);
2. Tests of Materials of Construction: Timber (International Engineering Congress, 1904).

BIOLOGY

By a rearrangement of the studies of the fourth year, two new subjects now appear for the first time upon the tabular view: namely, municipal laboratory methods and plant physiology. The former is to be in charge of Mr. Winslow, Instructor in Biology, and is designed to equip graduates of Course VII. with some of the latest technical methods peculiar to municipal laboratories of bacteriology, hygiene, and sanitation. Several of the graduates of the Institute are already filling important positions in such State or municipal laboratories, the number of which is rapidly increasing with the growing recognition of the duties of communities towards the public health. Plant physiology will be taught by Professor Sedgwick, and is designed chiefly to supplement and strengthen the work in general physiology of living things.

Dr. Weysser has accepted the Assistant Professorship of Biology in Boston University, but will continue to give one or two of the shorter courses in zoölogy at the Institute. The classes of Boston University students which for the last two years have been taught in certain biological subjects in the Institute laboratories have been withdrawn, a new biological laboratory having been provided, for greater convenience and economy, in Boston University itself. Of this new laboratory Dr. Weysser has been made Director.

Professor Sedgwick finished his work for the State of Missouri on the Chicago Drainage Canal case in the Supreme Court of the United States at the end of May, the case closing with his rebuttal testimony. It now only remains for this, perhaps the most celebrated of sanitary cases, to be argued before, and decided by, the full Bench in Washington.

Professor Sedgwick was one of the two appointed speakers in

the Public Health Section of the recent Congress of Arts and Science at the Louisiana Purchase Exposition, the other speaker being Dr. E. J. Lederle, health commissioner of New York City during Mayor Low's administration. The subject assigned to Professor Sedgwick was "The Relation of Public Health Science to Other Sciences." On his way home from the Congress, Professor Sedgwick addressed (by invitation) the teachers of Indianapolis, Ind., on "A Neglected Subject in the School Curriculum" (physiology, hygiene, and sanitation).

Mr. F. F. Longley, a graduate student of biology and sanitary engineering during the greater part of last year, has been engaged by Messrs. Hazen and Whipple (themselves Institute men) to make a test-run of the new municipal water filter just built by them at Watertown, N.Y., to protect that city from a repetition of its disastrous experience of last year with an epidemic of typhoid fever due to polluted water. Mr. Longley has just completed a similar test of the new municipal water filter at Moline, Ill., under the general direction of Professor E. G. Smith, the eminent sanitary expert of Beloit College, Beloit, Wis.

Mr. E. E. Lochridge, also recently a graduate student of sanitary engineering and biology, was intimately associated with Professor Sedgwick in his work on the Chicago Drainage Canal case, and at the end gave important testimony based on his own investigations. He has lately made a detailed sanitary survey of the watershed of the reservoirs of Springfield, Mass., for the water commissioners of that city, and has now been appointed to an important permanent position connected with the construction of the new filters of the water supply of Springfield, for which a special appropriation of \$300,000 has been made by the city council.

Professor Prescott has resigned his connection as Lecturer in Bacteriology and Industrial Biology with the State Normal School at Framingham, in order to accept a similar position in Simmons College.

Mr. Winslow devoted the summer to work at the Sanitary Research Laboratory and Sewerage Experiment Station and to the preparation of a volume on Industrial Microscopy, which he now

has nearly ready for the press. It is designed as an aid to his class work in the subject.

Mr. Phelps also has given the whole summer to work at the Research Laboratory, and he and Mr. Winslow have now completed investigations there which, together with the work of students associated with them at the Sewage Station, will make four valuable papers for early publication.

Two of the popular leaflets on sanitary subjects which the donor of the Sewage Experiment Fund desired to have published have now appeared. Both are in "Series A.—On Dirt and Disease," one being entitled "Why Dirt is Dangerous," the other "Why Dirty Milk is Dangerous." Both have had their original appearance in the *Journal of the Massachusetts Association of Boards of Health*. Copies may be had by any alumnus on request.

THE GRADUATES

ALUMNI ASSOCIATION OF THE M. I. T.

The Executive Committee of the Alumni Association has appointed the following committee to nominate officers for the coming year: Everett Morss, '85, chairman; Henry B. Wood, '76; Timothy W. Sprague, '87; William A. Johnston, '92; Leo W. Pickert, '93.

REPORT OF THE TREASURER OF THE TECH REUNION COMMITTEE.

Receipts.

From sales of tickets	\$6,138.92
From Alumni Association	1,000.00
From miscellaneous sources	3.00
From Guarantee Fund	524.15
From interest on bank deposit.	15.47
	<hr/>
	\$7,681.54

Expenditures.

Publicity and correspondence	\$897.19
“Pop” concert	1,593.27
Excursion	2,417.55
Somerset banquet	1,867.20
Rogers Building illumination	118.87
Badges	231.31
Hospitality	105.96
Headquarters	408.99
Miscellaneous expenditures	41.20
	<hr/>
	\$7,681.54

EDWARD G. THOMAS,
Treasurer.

BOSTON, Aug. 19, 1904.

REUNION STUNT PRIZE

The prize for the best stunt at the reunion excursion was awarded to the class of '68 through its secretary, Professor Richards. It was the intention of the Excursion Committee to ask President Pritchett to make the presentation at the Somerset banquet; but, as time did not allow, the committee invited Professor Richards to a dinner at Young's, and presented it with fitting ceremonies.

It was a small polished oak keg, with a removable head filled with Tech steins. It was inscribed:—

STUNT PRIZE

PRESENTED TO THE CLASS OF '68

FIRST IN TECH,

FIRST IN STUNTS,

FIRST AT THE KEG THAT CARRIES GOOD CHEER

WASHINGTON SOCIETY OF THE M. I. T.

Our June meeting fell on a miserably rainy night, the 20th, but fifteen men turned out as it was, and had a glorious dinner at the Cabin John Bridge Hotel. Several of the men were among those who had been on to the reunion, and were even then under the spell of that great event; and the "stay-at-homes" were soon made to believe that they had missed one of the most important spectacles of the century.

The men got together again on July 15 for an informal smoker and to extend the courtesies of the society to Mr. Frederic H. Fay. Our guest had a word to say about the merger proposition, which was the signal for an open discussion. There appears to have been no weakening in the attitude of the alumni here upon this matter. The meeting was held in the new home of the University Club, our society having been the first to be accorded the privilege of holding its meeting at the club-house. This was eminently fitting, inasmuch as the club owes its inception to members of our society. The building was thrown open for inspection July 4, and the large crowd

of college men who attended that day were delighted with the excellent quarters in which the club was installed. Large framed photographs of all the presidents of the Institute arranged about a bronze seal form a conspicuous feature on one of the walls, these decorations having been a gift from our society. A large room on the third floor has been set aside for alumni gatherings, and was located as near the roof as possible to allow that portion of the building to be raised without disturbing the cogitations of those in the rooms below. The grill and dining rooms are in the basement, the lounging-parlors and reading-room on the first floor, and the billiard, pool, card, and writing rooms and office on the second floor.

The following committee has been elected to co-operate with the Technology Fund Committee: Winthrop Cole, '87, chairman; B. Herman, '99; F. D. B. Ingalls, '01; and A. W. Proctor, '99. The Washington Society extends greetings and best wishes to the new association at Annapolis.

ALBERT S. MERRILL, '00,
Bureau of Standards.

THE TECH SOCIETY OF PHILADELPHIA

We are planning to make this winter a notable one in the history of the society. In other words, we intend so to organize the society that it shall be not only a social club, but one which will be of positive benefit to its members and to Tech men who are new-comers to the city. It must be remembered that we are young yet. Reckoning from the date of our reorganization, we have only had two meetings in which to get well acquainted; but we feel ourselves healthy, the spirit of the reunion is behind us, and, when this fall we have adopted our constitution and by-laws, we shall be ready to again take our place in the line with the stalwart Tech societies of New York, Washington, and the North-west.

Our reorganization came about largely through the efforts of "Steve" Gardner, '02, who, with ten other Tech men, all residents of Woodbury, N.J., to back him up, decided that it was a crying shame that "Tech" meetings were not held occasionally somewhere nearer than New York. Early in February circulars were sent out to the younger alumni announcing a dinner to be held at the "Gar-

rick," in Philadelphia, March 2. Forty-odd men responded, and we had a rousing meeting and a good time all around. A committee was appointed to transact temporary business and to arrange for a regular meeting to represent all alumni residing in and about Philadelphia. This committee was composed of the following men: James Swan, '91; Benj. Adams, '95; Frank Keisker, '97; Chester F. Drake, '98; S. A. Gardner, Jr., '02.

March 20 about 180 circulars were sent out to all the men whose addresses we could get hold of residing within twenty miles of Philadelphia, announcing the fact that a movement was started to re-organize the society. The annual dues were set at one dollar, registration cards were sent out, and a regular meeting called for April 15. This meeting, which was entirely informal in character, was held at the T Square Club rooms on Chancellor Street, Philadelphia, and twenty-five men were present. Beer, smoking material, and a light lunch were served without charge, and it was the unanimous opinion that such meetings could be held oftener and to better advantage than the more formal dinners. The following permanent officers for 1904 were elected: Mr. Benj. Adams, '95, president; William Gage Snow, '89, vice-president; S. A. Gardner, Jr., '02, secretary-treasurer; A. W. Ayer, '89, Chester F. Drake, '98, Frank H. Keisker, '97, J. Peterson Ryder, '84, Samuel Sadtler, '95, Paul Weeks, '02, executive committee; and the society was launched with fifty-six regular members.

It was voted to send for copies of the constitution and by-laws of the other societies, and that the committee should take up this question and report at the next regular meeting. So affairs ended in the spring. A few of us attended the reunion. I am afraid our delegation was small, but those that went returned most enthusiastic over the good times they had, and with enough Tech spirit instilled into their veins to enliven our whole society.

As for news from our members, I am sorry to have to note the loss by removal of our chief promoter and secretary-treasurer, Steve Gardner, who left the New York Ship Building Company in August to take a position with the Holland Submarine Boat Company of New Suffolk, L.I. Friends of his will be doubtless inter-

ested to know that his former room-mate, Carl Allen, '02, was last heard from in Honolulu, bound for 'Frisco, acting as second mate on the steel clipper ship "Hawaiian Isles." It is also rumored that we are about to lose Allen Loomis, '99. Harold A. Everett, '02, is a temporary resident with us in Woodbury while working for the United States Light-house Board. He returns to Tech in October to take up his duties as assistant in Course XIII.

JERE. R. DANIELL, '97, *Acting Secretary,*
102 Cooper Street, Woodbury, N.J.

NEWS FROM THE CLASSES

1868.

PROF. ROBERT H. RICHARDS, *Sec.*, Mass. Inst. of Technology,
Boston, Mass.

Whitney Conant was married September 8 to Miss Mary Frances Doe at Lexington.—Robert H. Richards has been at home all summer, writing up notes for his classes in mining.—Eli Forbes had his usual trip for his vacation to Campobello.—Bryant Tilden is back at Jamestown, So. Dak.

1876.

JOHN R. FREEMAN, *Sec.*, 145 Morris Avenue, Providence, R.I.

The following is from the Minneapolis *Journal* of September 27, 1904:—

Charles A. Morey died suddenly at Winona, Minn., September 26. He was born Aug. 9, 1851, in Vershire, Orange County, Vt., where he lived on a farm with the family until he was ten years of age, when his parents settled in Wabasha County, this State, where he lived on a farm till 1864, when the family moved to Lake City. In 1871 he entered the Winona Normal School, and was graduated in 1872. In the fall of that year he entered the Massachusetts Institute of Technology, there taking a special course in sciences, preparatory to accepting a position in the Winona Normal School as professor. He succeeded to the presidency of the Normal School in 1876, upon the resignation of President Phelps.

Although Morey was compelled to leave in the second year of his course, he was counted one of the strongest men in the class. He was especially strong in physics, and did some excellent work in the laboratory on an improved phonoautograph, which is said to have materially advanced the state of the art and been the fore-

runner of the phonograph. He was a friend of Professor Boutelle, of whom the REVIEW published an obituary note last year. Morey married the daughter of one of the prominent lawyers of Winona, and a few years later resigned from the presidency of the State Normal School at Winona to become a partner in the law office of his father-in-law; and from various sources I have understood that he had become one of the leading citizens of that part of the State.—John R. Freeman received the degree of Doctor of Science from Brown University at the last Commencement.

1877.

RICHARD A. HALE, *Sec.*, Lawrence, Mass.

H. H. Carter, of the Metropolitan Construction Company, is busy with some large sewer construction contracts in the Back Bay District, Boston.—The class secretary recently made a visit to the works of the Maryland Steel Company at Sparrows Point, Md., of which F. W. Wood, '77, is president. The Marine and Dock Department has a large amount of interesting work in process of construction, including steamers for dredging purposes and for coast trade. Among the most interesting work under construction was a large steel floating dock, 500 feet in length and 150 feet in width, being built for the United States government to go to Cavite, P.I. It is designed to dock the largest battleship constructed, and will be towed to Cavite via the Cape of Good Hope, by the last of the year. A contract has been taken for several New York Staten Island ferry boats, which will keep the works in active operation for some time to come. Several other M. I. T. men are engaged in various parts of the plant.—A call was made at Plainfield, N.J., where H. D. Hibbard, '77, is vice-president and manager of the Manganese Steel Safe Company, with works located at this place. Owing to the extremely hard properties of this steel, ordinary steel-cutting tools cannot be used, and emery wheels in specially designed grinding machines are used in making the joints. These machines were designed by Mr. Hibbard, and accomplish results which would

otherwise be practically impossible. The safes and vaults are rendered burglar-proof by the use of this steel.—George J. Baldwin, '77, was one of the most distant members to attend the reunion. He is much interested in electric light and water power companies in the South.—George A. Nelson, '77, assistant city engineer at Lowell, has the superintendence of the sewer work at present, owing to a change in the force in this department.

1881.

FRANK E. CAME, *Sec.*, 17 Place d'Armes Hill, Montreal, P.Q.

Lieutenant Henry N. Sweet got mixed up in an automobile accident with Mr. Borden, of Fall River, about two weeks after the reunion, and was laid up for almost two months. He is out again, and all right now.—Frank Chase is mining engineer with the Great Eastern Mining Company of London, England, at their mine at Mandalay, Burmah.—Frank Rollins's name is still in strong evidence in New Hampshire during Old Home Week, of which he was the institutor.

1882.

WALTER B. SNOW, *Sec.*, Russell Avenue, Watertown, Mass.

Hersey is now connected with the Wadsworth Braiding Company, of 456 Potter Avenue, Providence, R.I. His home address is 8 Parkside Road, same city.—The following record of service of A. B. Jackson, who was with the class in its Freshman year, appears in Cullum's History of the Graduates of the Military Academy: "Served West Point, in Department of Mathematics 1887 to 1891; served with his regiment at Fort Robinson, Neb., 1891-96; professor military science and tactics, University of Nebraska, 1897; died, Lincoln, Neb., Nov. 19, 1897."—Manning has severed his connection with the Wheeler Condenser and Engineering Company, and is now in the East.—Munroe is prominent in the work of the Technology Fund Committee.—The September issue of *House and Garden*

contains an illustrated description of the beautiful residence of Frank Cheney, Jr., at South Manchester, Conn.

1883.

HARVEY S. CHASE, *Sec.*, 27 State Street, Boston, Mass.

R. Tilden Gibbons lunched with the secretary recently. Gibbons is engaged in accounting in New York City. His son, twenty years old, is on the crew of the New York Athletic Club.—Horace Gale and Frank Davis have headquarters at 247 Atlantic Avenue. These two, with George Underwood, represent the class upon Technology Fund subscriptions.—The secretary recently attended the Congress of Accountants at the St. Louis Fair as the delegate representing Massachusetts.

1885.

I. W. LITCHFIELD, *Sec.*, 161 Devonshire Street, Boston.

The advent of the "'85 Hustler," to which the success of the reunion was no doubt largely due, added much to the fame of the class of '85, as the first monthly periodical thus far reported. Not that it appears *every* month, but monthly in the sense that it is not published oftener than once a month. To many anxious inquirers we would say that there will be another issue before Christmas. It will be our annual uncensored number. The various historians of the reunion have failed to note one of the most important and imposing features,—the illumination of the '85 class tree after the "Pop" concert. The tree is an American elm, presented to the class by the city of Boston through its forester, and occupies nearly all the campus officially recognized as ours by President Walker. It was loudly cheered by the assembled multitude. Electric effects by Professor Morss.—Morss, by the way, has been made chairman of the Income Fund Committee, which of course accounts for the immediate success of the enterprise. It will be remembered that he took the mining course, but his record as a financial engineer

will no doubt entitle him to that degree when the returns are all in. The Technology Fund promises to set a new mark for Institute alumni in keeping with the enthusiasm of the reunion. The class of '85 will do its part, as usual.—The search-lights of Port Arthur may not know it, but for a brief period of time, one dark night this summer, they shone upon our new president, Charles R. Richards. Richards shook the dust of New York from his feet Dec. 5, 1903, and returned to the welcoming arms of his friends Sept. 10, 1904, spending most of his time in Egypt, India, China, and Japan. He says that a visitor to Japan would hardly know that she was at war.—While spending his vacation in the White Mountains, Oakes Ames climbed Iron Mountain in his automobile,—a feat never before accomplished.—One of the great features of the '85 stunt at the reunion excursion was Billy Spalding's exhibition of bone juggling. It was a great act, and recalled the first Tech show,—the great and only minstrel performance given in Union Hall, about 1883. Billy had a chance then and there to go on the road with Leavitt's No. 3 troupe, and P. G. Shortis, banjo soloist, said it. This teaches us that opportunity is often lost through indecision.—Please bear in mind that next year is our twentieth anniversary, and there will be something doing. '85 will be in the lime light, and will again demonstrate that "age cannot wither nor custom stale her infinite variety." Better begin to rub some gum goozeum on your joints, and brush the side foliage over that bald spot, for we may have to play "follow your leader," and Bob Richardson may be "it."

1887.

EDWARD G. THOMAS, Sec., 4 State Street, Boston, Mass.

The June number of the *Architectural Record* contains an illustrated article, by A. O. Elzner, on the "First Concrete Sky-scraper in the World." This building is the Ingalls Building, corner of Fourth and Vine Streets, Cincinnati, of which Mr. Elzner was the architect. The building is 210 feet high, 16 stories, and contains no structural iron, the walls, floors, columns, stairs, etc., being com-

posed of twisted bars bedded in concrete, the building forming a concrete monolith. The walls are only eight inches thick.—T. W. Sprague has just returned from an investigation of coal lands in West Virginia, which occupied him during the month of August.—F. M. Wakefield has moved into very commodious quarters at 9 Park Street. He has spent the greater part of the summer at Bar Harbor, where he is building a number of houses. He expects work on the Nashua (N.H.) post-office building to be started very soon.—Henry Souther is serving on a jury of awards at the Louisiana Purchase Exposition.—Arthur Nickels spent much of the summer at his home in Cherryfield, Me., but passed through Boston recently on his way to Encampment, Wyo., where he is to take charge of the engineering work of the North American Copper Company.—F. C. Todd reports the birth of a daughter, Lydia, on August 11, and says that she is the result of years of thought and study and a credit to the class of '87. Since the Baltimore fire, when the offices of the General Electric Company were burned, Todd's headquarters have been at the Mt. Royal apartment house, Baltimore.—N. P. Ames Carter has joined the ranks of the automobile fraternity, with a large Knox runabout.

1888.

WILLIAM G. SNOW, *Sec.*, 245 North Broad Street, Philadelphia, Pa.

William T. Keough was married, June 29, to Miss Rose Butler, of East Boston. Mr. and Mrs. Keough reside at 326 Saratoga Street, East Boston.—Dwight H. Perkins, architect, of Chicago, is a recent contributor to *Good Housekeeping* of articles on heating, ventilation, and health.—William H. Blood, Jr., has been elected chairman of the Committee on District Steam Heating of the National Electric Light Association.—Stone & Webster have been retained by Secretary Morton of the Navy Department to examine the various lighting and power plants in all the United States navy yards, and report on the desirability of combining them into one power plant for each yard.—Stephen Child, landscape architect, reports

that he is very busy on new work in his line at the present time.—George W. Hamblet takes pride in a steam automobile which he is using in touring the country around Lawrence, Mass., built entirely at the shops of the Hamblet Machine Company, of which he is proprietor.—Edwin S. Webster entered his automobile boat "Auto Win" in the races of the Eastern Yacht Club, and won every race in which it was entered, including the Gay cup. This is a remarkable performance, considering the fact that Mr. Webster built the boat principally for the use of his family. His boat showed better endurance than the high-powered freak racing machines, and consequently won a greater number of races.

1889.

PROF. F. A. LAWS, *Sec.*, Mass. Inst. of Technology, Boston.

Prof. F. H. Thorp, of the Institute, writes as follows:—

I have recently returned from our Summer School of Industrial Chemistry, after a very pleasant trip through Central New York. We started June 8, and disbanded June 25 at Buffalo. I am too busy just now to write a detailed account of all that happened and the fine treatment we had from past Tech men and others, but will do so at some later date.

The nature and practical importance of such a trip as that which Professor Thorp has just conducted may be gathered from the following press reports. The first is from the North Adams *Transcript*:—

Twelve members of the Class of Industrial Chemistry at the Massachusetts Institute of Technology, Boston, with F. H. Thorp, professor of industrial chemistry, are in this city to-day, which is their first stopping-place in a tour of industrial communities. The young men visited the Arnold Print Works this morning, and were shown through the entire plant for purposes of observing the processes employed in cloth printing. They will visit a number of industrial plants in the course of their trip through this section, and expect to go to Stamford, to go through the plant of the Stamford Chemical Company.

Later report of the party is found in the Syracuse *Post-Standard*, which says:—

Thirteen students from the Massachusetts Institute of Technology at Boston, accompanied by Professors F. H. Thorp and W. H. Walker, of the Chemistry Department of that institution, arrived in this city yesterday afternoon, to inspect a number of the manufacturing plants of Syracuse for the purpose of learning the actual conditions prevailing here. The party will remain in this city to-day, leaving to-morrow morning for Olean. The only inspection made by the students yesterday afternoon was at the salt blocks, where they investigated the process of making salt, and learned some of the practical points in the manufacture of this commodity. Professor Thorp stated last evening that he was much interested in the plant viewed by the students, and would have liked more time to make a careful study of it. The plans of the party for to-day include visits to the Onondaga Pottery Company in West Fayette Street, the Crucible Steel Company in Magnolia Street, and the Empire Cement Works at Warner. At each of these places the students will study, in a general way, the engineering and chemical aspects of the industries.

This tour of various manufacturing concerns is made once every two years, in different sections of the country. This is the first time Syracuse has been visited in a number of years. The students from each of the four classes of the Institute are allowed to elect this work, which takes the place of a summer school and is intended to give them a view of a variety of practical industrial operations.

The party has already visited several important manufacturing places in the East, and will stop at various points between this city and Niagara Falls, where they will disband and return to their homes for vacation. The itinerary this year includes the following places: North Adams, Mass.; Stamford, Vt.; Mechanicsville, Ballston, Glens Falls, Syracuse, Olean, Silver Springs, Warsaw, Rochester, Buffalo, and Niagara Falls.

—Henry M. Hobart is continuing his studies in the general design of electrical machinery. The *Journal of the Institution of Electrical Engineers* (London) for May contains a paper on "The Rated Speed of Electric Motors as Affecting the Type to be Employed." He summarizes his principal conclusions as follows: I. Inductive motors are, for all capacities, considerably cheaper than continuous-current motors of equivalent ratings. II. The general performance

and the mechanical construction of induction motors improve rapidly with increasing rated speed. III. The general performance and the mechanical construction of continuous-current motors improve rapidly with decreasing rated speed. IV. The use of low-speed induction motors and very high-speed continuous-current motors ought to be avoided whenever this is commercially practicable. In the discussion of this paper such distinguished authorities as Dr. Sylvanus P. Thompson and W. B. Esson participated. All paid tribute to the very important work Hobart is doing in his chosen field.—Hollis French states:—

The largest work which we have on hand at present is the dam at Garvins Falls, N.H., on the Merrimac River, which is practically completed. We have been engaged on work at this point for several years, but the present dam was not started until eleven months ago, since which time we have been able to complete it. The falls are now developed for 6,000 horse power, all of which is transmitted to Manchester, fifteen miles away. The management of the work has been largely in the hands of J. W. Rollins, Jr., '78, of the firm of Holbrook, Cabot & Rollins, who were the contractors for the work, with whom our relations have been very pleasant. We have recently remodelled the electric light station for the Fall River Electric Light Company. My third son, Hollis Stratton, was born August 15.

—Clifford F. Crosby is with the Albert B. Franklin Company, with address at 165 Fort Hill Square, Boston, Mass.—Rev. Charles E. Beals is now settled in Cambridge, Mass., being pastor of the Prospect Street Church (the First Evangelical Congregational Church in Cambridgeport). His residence is at 3 Ellsworth Avenue.—F. L. Dame is engineer to the Committee on Local Companies of the General Electric Company, with headquarters in Schenectady, making frequent trips to inspect the various installations under its charge. This committee attends to the interests owned by the General Electric Company in local lighting and railway plants.—It is noted in the June 11 number of the *Engineering Record* that Professor Arthur L. Williston, of the Pratt Institute, Brooklyn, is a member of the commission to outline the scheme on which the work of the new Carnegie Technical Schools

of Pittsburg is to be administered. The problem laid before the architects under this scheme is that of providing for the instruction of four thousand students, including both day and night classes.—From Boston *Evening Transcript*, Sept. 20, 1904:—

Franklin W. Hobbs, of Brookline, has been elected chairman of the School Board of that town, to succeed Prentiss Cummings, who several months ago tendered his resignation. Mr. Hobbs has served as secretary of the board for several years. His successor has not yet been chosen. He was born in Roxbury in 1868, but has lived in Brookline since 1878. He attended first a private school, and prepared for the Massachusetts Institute of Technology at the Brookline High School, where he was graduated in 1889, in the Mechanical Engineering Department. For two years after receiving his degree he remained at Technology as a member of the teaching staff. He is now treasurer and an executive officer of the Arlington Mills Corporation. Mr. Hobbs has been identified with public movements in Brookline. He is a member of the Brookline Education Society and a vestryman of St. Paul's Church. He was one of the original trustees of the Lowell Textile School, which position he still holds. He is a director of the Arkwright Fire Insurance Company, a member of the National Association of Wool Manufacturers, of the New England Cotton Association, and of the Country, Technology, and Union Clubs.

1890.

GEORGE L. GILMORE, *Sec.*, Lexington, Mass.

Winthrop T. Hodges, in the examination held in July for the position of appraiser of machinery for the port of Boston, passed with the highest mark, and received the appointment.—E. V. Seeler is in business by himself as an architect, with offices at the Real Estate Trust Building in Philadelphia.—F. P. Royce is now making his home in Dedham, Mass.—Frederick E. Kingsbury, who will probably be best remembered by the boys as one of our buglers in our Freshman battalion, died at his home in Keene, N.H., June 25, from burns received in a gasoline explosion in his automobile house. It is thought that he was engaged in filling the naphtha tanks when the explosion occurred. He leaves a wife and three

children.—Benton Sturges was among the entries in Chicago at the Midlothian Club Summer Golf Tournament. He qualified for the Burr Oaks cup, and was not beaten until the semi-finals.—Calvin W. Rice has at last become a Benedict. He was married to Miss Ellen Moseley Weibeahn at Winchester, Mass., August 6.—Dr. Franklin W. White and Miss Ethel Plummer Bowen were married Sept. 1, 1904, at the home of the bride in Plainfield, N.J.—

Mr. W. B. Poland has resigned as superintendent of the Indiana Division of the Baltimore & Ohio South-western Railroad, with headquarters at Cincinnati, and will assume charge of the construction and operation of the Alaska Central Railroad. Mr. Poland will spend a month or six weeks investigating the project in the interests of capitalists.

If his report is favorable, the parties he represents will finance the road, which is to extend from Cape Resurrection northwardly about four hundred and fifty miles to the Yukon River.

Mr. Poland is a graduate of the Massachusetts Institute of Technology, and began his railroad career on the C. C. C. & St. L. Railway, where he had charge of surveys and maintenance for a number of years.—*Engineering News*, Oct. 13, 1904.

1891.

HOWARD C. FORBES, *Sec.*, 4 State Street, Boston.

Herbert S. Kimball announces his engagement to Miss Florence M. Phillips.—Robert S. Ball was in this country during the meeting of the electrical engineers.—Walter B. Douglas, vice-president of the New England Structural Company, states that his company has secured the contract for the steel work on the first section of the new Washington Street Subway in Boston. This will require about four hundred tons of material.—James Swan, of the United States Ship-building Company, Camden, N.J., has been in Boston recently on his vacation. During the coming winter he will give a series of lectures at the Institute of Technology on the method of laying out a ship-yard. His company is building, at the present time, the battleship "Kansas" and the cruiser "Washington" and five steam light-ships.—Harry H. Young, treasurer of the J. L.

Hammett Company, has returned from his trip abroad. He was gone about ten weeks, spending a week in London, a week in Paris, a week in Lucerne, and taking a trip through Switzerland and down the Rhine.—Stephen Bowen, president of the John F. Brooks Company, states that they have just enlarged their plant at Highlandville, Mass., about one-third. They manufacture children's knit goods, underwear, sweaters, and specialties. Their principal office is in New York. Their business this year has shown an increase over a corresponding period last year.

The following letters, written at the time of the reunion, contain matter which, I think, will be of interest:—

GENERAL ELECTRIC COMPANY.

PHILADELPHIA OFFICE,
218-226 SOUTH ELEVENTH STREET,
May 30, 1904.

Dear Sir,—I am very sorry, indeed, to have to write you that I shall not be able to be present at the Tech Reunion on the 6th, 7th, and 8th of next month. I have delayed answering until the present time, hoping that I might be able to attend.

I will, however, be with you all in spirit, and trust that the alumni may succeed in persuading the Corporation to maintain the individuality of the Institute by avoiding any merger with Harvard.

With best wishes to all and trusting that the reunion may be entirely successful, I am,

Yours very truly,

T. V. BOLAN.

STANDARD UNDERGROUND CABLE COMPANY.

PITTSBURG, PA., May 27, 1904.

Dear Garrison,—I have your letter of the 25th, and am sorry to say that it will not be possible or advisable for me to come to Boston to attend the present reunion, in view of absences from this office which make my presence practically necessary.

I have been delaying sending a formal regret to Forbes because I had hoped up to the present time that something might come up which would enable me to be with you.

I should be charmed to see you all again. I hope you will all have a very nice time, and that you will successfully smash any idea of combination between the Institute and Harvard once and for all.

I have no news about myself, as I seem to be trotting along in the same

old way without any grand march which distinguishes one day from the next.

I hope you will allow me to say in this connection that, if a subscription toward the expenses of the class would be in order, I should be very glad to send one if you will let me know about what it should be.

Please remember me kindly to all the boys, and, with very kind regards to yourself, believe me,

Yours sincerely,

F. S. VIELÉ.

JAMES A. ROONEY,
GENERAL CONTRACTOR.
CONTRACTORS' AND BUILDERS' ASSOCIATION.

95 MILK STREET, BOSTON.

MAY 28, 1904.

My dear Garrison,—It will be impossible for me to attend the class dinner, June 7, as I shall be out of town that week.

I shall be with you in spirit, and hope the weather is good; for I know the "boys" will attend to everything else to make the reunion a grand success.

I am interested in an oiling device, which has taken me away from Boston a great deal this summer, and compels me to be in Philadelphia on that day.

Hoping the dinner will be very successful, I am,

Very truly yours,

JOHN A. ROONEY.

THE CUTLER-HAMMER MANUFACTURING COMPANY.

136 LIBERTY STREET, NEW YORK CITY.

MAY 16, 1904.

My dear Mr. Forbes,—The class of '91 literature, addressed to James Francis White, in my care, came to hand this morning.

Mr. James Francis White died in October, 1897, at Rainbow Lake, Franklin County, N.Y., after an illness extending over about eight months, his death being due to consumption.

It was my good privilege to be intimately acquainted with Mr. White during the last five years of his life, we having been together in business from the summer of 1892 up to the time he was obliged to leave on account of his health. We were not only together in business, but roomed together at "The Ohm" in Brooklyn until he was obliged to go away early in the spring of 1897. During the winter he had contracted a severe cold, which grew into a bad attack of the grippe; and consumption was the outcome.

He was obliged to leave business early in the spring of 1897, and went to the Adirondack Mountains for his health, where he remained during the summer, at first apparently gaining, then gradually failing in the fall, until he died about the middle of October. A number of the boys from "The Ohm," all Tech men, attended his funeral at Waterbury, Conn., where his parents still live.

Mr. White had a large circle of personal friends in the class of '91, and I am sure they that will regret to hear of "Jeff's" death. He was certainly one of the finest fellows and most amiable companions that one would ever meet. In his business he was entirely successful, and would have been well known in the electrical field to-day, had it not been for his untimely death.

Regretting that it should be my duty to have this report to make concerning him, I beg to remain,

Yours very truly,

R. H. MANSFIELD, Jr., '92.

Miss D. L. Bryant, S.B., M. I. T. '91, course in geology, graduated at Erlangen, June 30, 1904, with the degree of Doctor of Philosophy, receiving the distinguished honor of *magna cum laude*. After completing her course at the Institute, she taught geology at Greensboro, N. C., and before leaving for Europe she studied petrography with Dr. Van Hise at Madison, Wis. She has since studied at Heidelberg, and for the past two years has been at Erlangen. Her graduating dissertation was upon "The Petrography of Spitzbergen."

1892.

PROF. WILLIAM A. JOHNSTON, Sec., Mass. Inst. of Technology.

J. Scott Parrish writes in reference to the reunion:—

The enclosed postal card tells a sad story, as I find it is going to be utterly impossible for me to be present at the Tech reunion. This is a great disappointment; but, if you find time after the reunion, I will greatly appreciate it if you will send me a short account of it. Please remember me very kindly to all the fellows, and with very best wishes for its success.

—Sumner B. Ely writes in reference to letters sent to the class at the time of the reunion:—

Your appeal for information is so strong as to certainly deserve attention, and I regret that I cannot write you something of interest. I can, however, extend an invitation to any of our classmates who happen to be passing through this smoky city of Pittsburg, and hope I may have the pleasure of some calls one of these days.

I might also say that on the first of the year the sheet and tin interests of the United States Steel Corporation were merged into one company, entitled the American Sheet and Tin Plate Company. The former chief engineer of the American Tin Plate Company has been made assistant to the president of the new company, and is also acting in a consulting capacity, and still retains the title of chief engineer. I have been made his assistant.

—George F. Rowell, who is assistant engineer in the Susquehanna Canal and Power Company, writes:—

The city office of this company, with which I am an assistant engineer, was destroyed in the Baltimore fire; and I was moved to the country office at this place (Conowingo, Md.), which is on the left bank of the Susquehanna River, twelve miles above its mouth. I am busy on the preliminary plans of a power development. There is no construction work as yet, but, when it does start, there will be a lot of good work.

—Macy S. Pope, who is an inspector in the Factory Mutual Fire Insurance Company, writes:—

For class news it may be of interest to note that A. L. Jacobs, VI., until recently employed in the Wire Department of the City of Boston, is now electrical inspector for the Factory Mutual Fire Insurance Company. This makes the sixth '92 man connected with our office at 31 Milk Street, probably the largest number of any one class employed in one office.

—The firm of Weeks, Kendall & Newkirk, consulting engineers, of Kansas City, Mo., has been dissolved. Kendall is continuing the business with Mr. Weeks. Newkirk has returned to Detroit, and is the manager of the engineering department of the Buhl Malleable Company, where he is developing a system of conveyors and trav-

ellers and general link-belt engineering.—Arthur J. Ober has returned to the United States Engineer Office at Newport. During last season he has been employed making extensive surveys of the Connecticut River Valley, by the United States government, to determine the feasibility of the improvement of its navigation.—Packard for four years has been acting as engineer or manager of the J. S. Packard Dredging Company in the improvement of New England waterways. Found his Tech course of great advantage in this line of work, particularly in the design and construction of a large new dredge, on somewhat new lines, a year ago. Had a dredge working for several months at the Fore River Ship and Engine Company, Quincy, Mass.—George Hunt Ingraham, who is now a successful architect, with rooms at 2A Park Street, Boston, writes:—

It is always pleasant to hear of each other's doings. In 1895 I started to practise architecture for myself, and have had a good practice ever since. In 1898 I was married, and built this house, a reproduction of which I enclose. In 1903 it became necessary to enlarge my business quarters, so that I am now better prepared to execute all kinds of work that require an architect. I have in consultation with my work specialists who are prepared to take charge of heating and ventilating, plumbing and sanitary work, electric and mechanical work, landscape work, and garden architecture.

You may need some time the services of an architect, and, if so, do not forget a '92 man.

—Ruth Stevens Johnston, born March 20, 1904.—It was a pleasure to note in the last issue of the REVIEW the promotion of Wendell and Derr to be associate professors in the Department of Physics.

1893.

FREDERIC H. FAY, *Sec.*, 60 City Hall, Boston.

It is our sad duty to announce the deaths during the past summer of three members of the class: Kilburn Smith Sweet, who died July 15; William Irving Hahn, on July 22; and George H. Thomas Lane,

on August 29. Sweet's death was due to acute congestion of the brain, and the news of his passing away comes as a shock to his classmates, who will keenly miss his genial and kindly presence at our gatherings, where he was generally to be found. For the eleven years following graduation he had been engaged in teaching at the Institute, having been made instructor in hydraulics in 1895, which position he held at the time of his death. Although considerably fatigued at the close of the last school year, he did not then take a much-needed rest, but instead began at once his summer's work as assistant engineer to Leonard Metcalf, '92. After a few weeks, however, a complete rest being imperative, he gave up all work, and his condition seemed to improve until within two or three days of his death. The end came suddenly and unexpectedly July 15, 1904. Of quiet, unassuming manner and a rather retiring disposition, Sweet as a student was not prominently identified with class affairs; but during the four years of undergraduate life his genial good-nature, loyalty, and sterling worth won for him many true friends. To all whose privilege it was to know him the memory of his friendship will remain as one of life's precious possessions. To his widow, in her great bereavement, the class extends its deepest sympathy. Hahn was with the class during the Freshman and Sophomore years, and was well known, especially to his fellow "mechanicals." The following account of his death is taken from one of the Boston papers:—

William Irving Hahn, formerly of East Boston, died Friday (July 22, 1904), at Archer, Fla., where he went two years ago for his health. He was thirty-three years old, and was well known in East Boston. He graduated from the East Boston High School, class of 1889, then took a special course at the Massachusetts Institute of Technology. He engaged in commercial pursuits as an engineer, then entered the Boston University Law School in 1899, graduating with honors in 1902. His health failing, he went South. He was prominent in social affairs of East Boston, being for years active in the management of the Bereton and Jeffries Winter Clubs.

George H. T. Lane was prominently connected with the class for nearly four years, though he did not complete his course, that

of mechanical engineering. After leaving the Institute, he was with the Lane & Bodley Company of Cincinnati, as draughtsman, erecting engineer, and salesman, from 1893 to 1896, and with the Harrison Safety Boiler Works in 1897. For two years he was engineer of the Cia di Fundicion de Ferro y M'f'r'a de Monterey at Monterey, Mex. Since 1899 he had been engineer, secretary, and treasurer of the Lane & Bodley Company. Particulars of his death, which occurred on Aug. 29, 1904, are not yet at hand. In the death of Lane the class loses a member for whom there existed a deep and true regard in the hearts of the many who knew him. Accounts of all of these men will appear later in the necrology of the REVIEW.—Edward Bullard Carney, of Lowell, Mass., and Miss Lovinia Rice Butterfield, daughter of Mr. and Mrs. J. B. Butterfield, of Tyngsboro, Mass., were married at the latter place on Sept. 7, 1904. Mr. and Mrs. George J. Carney and Mr. and Mrs. E. B. Carney are "at home" at 39 Plymouth Street, Lowell, on Wednesday, the 19th of October.—William B. Gamble is connected with the Detroit Graphite Manufacturing Company, Detroit, Mich.—Frederick W. Hadley, electrical engineer with Westinghouse, Church, Kerr & Co., New York, has recently gone to Atlanta, his address being 1327 Empire Building, Atlanta, Ga.—From Vigan, Philippine Islands, under date of July 9, 1904, J. C. Hawley writes as follows:—

I am mighty sorry I could not be with you all at the meeting (reunion). It is quite a long way off, and walking is not very good, at this season of the year especially. I do hope and expect to be there next year, and hope to see all of the old fellows again. At that time I may have some things of interest to tell you, as perhaps I am seeing some things that you all have never seen, and may have no opportunity to do so. Everything is going as well as could be expected, considering the conditions of people and climate. Just at present we are having our rainy season, and it is a corker. A typhoon started the 24th of June; and since that time we have had over four feet of rain, and it is still on, with no sign of let-up. Everything is rather damp and sticky; but you get used to these things after you have been over here awhile, and nothing bothers you very much. . . . Remember me to any of the boys you see.

Hawley is provincial supervisor and civil engineer at Vigan, and has been in the Philippines nearly two years.—William F. Hunt, assistant engineer to French & Bryant, Brookline, Mass., has been located most of the time during the past two years at North Hatley, Province of Quebec, Can., where he is engineer in charge of the water supply, drainage, and general construction, upon a large private estate owned by Mr. Henry N. Atkinson, of Atlanta, Ga., a nephew of the late Professor Atkinson of the Institute. Hunt will return to Massachusetts at the close of the present season's work.—

To Henry Morss, our enthusiastic yachtsman, is due the credit of originating the idea and of making the entire arrangements for the ocean yacht race from Sandy Hook to Marblehead, held during the past summer by the Eastern Yacht Club. This race was planned for all sailing yachts not less than thirty feet water-line, and a total of thirty-four entries was reached; but, when the start took place, only ten yachts were at the line. There were two ninety-foot schooners, three schooners of smaller size, and five sloops and yawls from thirty to forty-two feet water-line. The start was made off Rockaway Inlet, just outside New York Harbor, at four o'clock on Wednesday, July 6. The course was to and around Nantucket Shoals Light-ship, which is anchored about forty miles south-south-east from Nantucket Island, thence around Cape Cod to Marblehead, a total distance of 331 miles. There was a fair southerly breeze at the start, but within two hours this all flattened out, and the rest of the race was sailed in a light and variable easterly breeze, which made windward work all the way to Nantucket Shoals Light-ship, a distance of 196 miles. On Thursday there was a thick fog all day, and also on Friday afternoon, when the big schooners rounded the light-ship, but it was clear when the others passed this mark. As a matter of course, the two ninety-foot schooners came in ahead, the "Lasca" being the first to cross the finish line Saturday afternoon, soon followed by the "Corona." Morss's thirty-five-foot sloop "Cossack," however, made a splendid showing. She was third at the light-ship Friday night, soon after midnight, and also third to finish, beating the second division schooners on actual time, and leading "Katonah," the next boat

in her own class, by about eight hours. The other three boats in this class did not complete the course.—The engagement is announced of Walter Irving Swanton and Miss Lucy C. Ross, of 3659 Page Boulevard, St. Louis, Mo. It is expected that the wedding will take place in October of this year. Swanton intends to reside in Washington, D.C., where he is connected with the supervising architect's office of the Treasury Department.—Charles W. Taintor returned to America in September from London, where for two years he has been engineer of the London office of the General Electric Company of New York. Taintor's pleasure at getting back to the States is very apparent, and his travels and residence abroad serve but to intensify his loyalty to the land of Yankeedom, which, to his thinking, is just a bit better than any other part of the earth. He hopes to arrange his business affairs so as to remain in this country, at least for some time. His British surroundings seem to have agreed with him, however, for he appears the picture of health.—Charles G. Waitt has severed his connection with the Metropolitan Water and Sewerage Board of Massachusetts to take a position with the Travelers Insurance Company of Hartford, Conn. Waitt is still located in Boston, and lives at 14 Sheldon Street, East Milton, Mass.

1894.

Prof. S. C. PRESCOTT, *Sec.*, Mass. Inst. of Technology, Boston.

The marriage of John Calvin Locke and Miss Adelaide Mary Fillmore took place on Saturday, July 2, at Cincinnati, Ohio. Mr. and Mrs. Locke reside at 311 Washington Avenue, Brooklyn.—McKibben, accompanied by Mrs. McKibben, has made an extended tour through the West during the vacation. They visited Niagara Falls, the St. Louis Exposition, Denver, Colorado Springs, and Cripple Creek, besides spending some time at McKibben's old home in Arkansas. The secretary was pleased to receive a post card from them from the top of Pike's Peak. As assistant engineer of the Massachusetts Railway Commission, McKibben spends

much time in bridge inspection, and has traversed the State pretty thoroughly in this work.—S. H. Thorndike returns to the Institute at the opening of the school year to assume the duties of instructor in hydraulics. Since graduation he has been engaged in engineering work for the city of Boston. Although of late his work has related especially to bridge design and detail, it has not been confined to these lines, so that he returns to the Institute with an enviable record of practical experience.—R. S. Weston is investigating a typhoid epidemic, due to infected water supply, at Lindley, Ont. Weston has recently equipped a very complete laboratory for chemical and bacteriological work in connection with his expert practice in sanitary lines.—J. W. Phelan and W. E. Piper have recently returned from a short trip to Nova Scotia, where Phelan is interested in some mining propositions.—S. C. Prescott is in charge of the work in bacteriology at Simmons College, where the subject is taken by a large number of students. He has written during the summer a popular article on "Ptomaines and Ptomaine Poisoning" and an article, published in *Science*, on "The Effect of Radium Rays on the Color Bacillus, the Diphtheria Bacillus, and Yeast."—A. W. Tidd, who for a year or so has been an assistant engineer on the Charles River Basin Commission has resigned, and has accepted a position as assistant engineer with the Aqueduct Commission of New York City.—A daughter has recently been born to Mr. and Mrs. R. W. Gilkey.

1896.

EDWARD S. MANSFIELD, *Sec.*, 70 State Street, Boston.

R. S. Hardy, formerly associated with the Telluride Power Company of Provo, Utah, is now one of the members of the Knight-Hardy Company, having offices at Provo, Utah. The firm deals in mining and real estate investments, and the members are also consulting engineers in the lines of electric power and irrigation. Mr. Hardy has lately made a trip through the central and eastern part of the country, interesting investors in a new town-site at Good Springs, Lincoln County, Nev., which they are developing.

Mr. Hardy is also interested in a number of electric light projects throughout the West.—Stewart S. Bell, until recently manager of the Municipal Electric Light Plant at Reading, Mass., severed his connection with the above company to enter another line of electrical work. He is at present, however, taking a somewhat protracted vacation before entering his new field.—E. C. Jacobs, professor of chemistry in the University of Vermont, has lately announced his engagement to Miss Mabel Nelson, of Burlington, Vt.—L. L. Lamborn, who graduated from Course V. and who has been for several years actively engaged in professional chemistry, and has also been the author of several books and papers on chemical subjects, is now taking a course in law at the St. Lawrence University, Brooklyn, N.Y. He also reports that he has recently been married.—Mortimer A. Sears, of Mineral, Va., spent his summer vacation at his former home in Athol, Mass. During his stay East he visited the Institute and friends in Boston.—Dr. J. A. Rockwell was away from Cambridge during the month of September, spending a vacation in taking various short tours through the eastern part of the country.—W. L. Root is now engaged in private business in Pittsfield, Mass.—Mortimer Frank, M.D., of Chicago, made a midsummer visit to Boston and vicinity, calling on many friends during his stay.—E. H. Laws has been seriously ill with typhoid fever at Park City, Utah; but latest advices point to his speedy recovery.—On July 24, E. S. Mansfield announced his engagement to Miss Elizabeth O. Bancroft, of Peabody, Mass.—Benjamin Hurd, of New York, was seen in Boston last month during a flying business trip to this city.

1898.

C.-E. A. WINSLOW, *Sec.*, Hotel Oxford, Boston.

A. C. Faught's present address is 2019 8th Street, Walbrook, Md.—Mr. and Mrs. Robert Starr Allyn announce the birth of a daughter, Helen Chapin, Aug. 6, 1904.—C. Bennink and A. H. Brown, '99, spent their vacation cruising off Marblehead, incidentally taking in the automobile races.—W. Brewster was married October 1

to Miss Mary Southgate, daughter of Mrs. Leavitt Taylor Robbins, at Plymouth Mass.—W. E. Putnam, Jr., and A. H. Cox have been working in temporary quarters at Nonquitt, Mass., upon the competition for the Carnegie Institute in Pittsburg.—E. N. Curtis visited the St. Louis Exposition during the summer, and later spent some time at Camden, Me. When asked for class news, the only startling piece of intelligence he had to offer was his intention to keep out of politics this fall.—Dr. R. E. Daly has been asked to read a paper on the "Embryology of the Teeth" before the New York State Dental Society on Jan. 11, 1905.—G. W. Treat, while automobiling at Bar Harbor in August, attempted to race with a trolley car, and when the fun was at its height, and the speed about forty miles an hour, he was unable to take a sharp turn, and shot across the trolley track and over an eight-foot embankment. The machine was smashed to pieces, but Treat very fortunately escaped serious injury.—A. S. Keene, H. P. Richmond, and B. F. W. Russell, in Guy Lowell's office, have been working on the competition for the Carnegie Institute in Pittsburg, and are now making plans for the McKinley Memorial at Canton. In the latter competition Mr. Lowell is one of the elected competitors.—L. J. Seidensticker spent the late summer and autumn in Boston, and carried on some investigations with C.-E. A. Winslow at the Sanitary Research Laboratory of the Institute.—I. H. Kaufman's present address is 120 Liberty Street, New York.—B. A. Adams is now living at 41 Irvington Avenue, Springfield, Mass.—A meeting of the '98 men about Boston was held at the Technology Club, July 26, to discuss the Technology Fund canvass. Dr. F. H. Williams, who was present on behalf of the executive committee, forcibly presented the importance of the undertaking, and answered a variety of questions as to its scope and significance. Before the meeting was over, twelve of the sixteen men present informally subscribed amounts aggregating \$595 a year for five years. In the hands of the Technology Fund Committee there are at present pledges aggregating \$832 a year from the following men: Lansingh, Weimer, Godfrey, Sturtevant, Swift, High, Davis, Newbury, Coburn, Winslow, Jacoby, Seidensticker, Nelson, Churchill, Humphrey, Thompson,

Small, Blanchard, Curtis, Wesson, Miss Usher, Dr. Lambert, and Mrs. (Mabel Forest) Lambert. '98, this way!

1899.

DR. MILES S. SHERRILL, *Sec.*, Mass. Inst. of Technology, Boston.

Clarence B. Cluff was married on Monday, September 12, to Miss Mabel Olive Davisson, of Chicago.—A. B. Foote, who has returned from Korea where he has been working for the last three years for the Oriental Consolidated Mining Company, is now assistant superintendent of the North Star Mines, Grass Valley, Cal. Foote writes:—

The first year that I was in Korea I worked as surveyor, which gave me a good opportunity of seeing the inside of all the mines of the group that is being worked, all of them gold mines. I made my headquarters at the largest mine of the group, and made the rounds of the three camps about every two months. There are more than three mines, and there are five stamp mills, two hundred stamps in all; but they are located in three groups, about twenty miles apart. After the first year I was made assistant superintendent of the largest camp, where they have one eighty stamp mill and one forty; and there I remained for two years. The work was very interesting and, on the whole, instructive, although the abundance of cheap labor makes the use of elaborate machinery unnecessary and uneconomical. All the miners were native Koreans, with a few Chinese sprinkled in; and it was found by experiment that hand drilling was cheaper than drilling with machines. The greatest problems arose from the distance to our base of supplies, as it took from three months to a year to get things sent out. Freight was not as high as one might suppose, considering the distance and number of handlings, because it came the greater part of the way by water. We got, I think, most of our supplies from the United States; but the manufacturers and shippers in this country should be more careful about packing articles to be sent by ocean freight and landed in lighters. It was constantly the experience to open a case of goods that we had been waiting six months for to find it ruined by water or all smashed to pieces because it had been packed as if it was to go a few hundred miles by rail instead of seven thousand or more by every kind of transportation.

The English are more careful about that sort of thing, and get a good deal of trade in consequence.

When I came away, about the 1st of April, the company's launch had not started its trips up the river; and so I went overland, on pony-back, one hundred miles to Chenampo, over the same route the Japanese army is taking, or was taking, to the Yalu. I passed several thousand men, I should say, although I think the main body of the army was above Anchu, where our road joins the main Pekin road. We were visited at the mines, first by the Cossacks, who went over the same road I afterwards took, cutting down telegraph lines, and afterwards by the Japanese. I have been amused by reading in the papers articles by Dunn and other war correspondents about their experiences in Korea. They seem to have had a very hard time getting around the country, and been very unfavorably impressed with the natives, chiefly, it seems to me, from not knowing how to treat them. The foreign employees of the company do a great deal of travelling about, making the trip to Seoul (three hundred and fifty miles and back) in the dead of winter, when the river communication is frozen up, quite frequently, and rather enjoy it. I went over the same ground that Dunn went over about a month after he did, and had a very good trip. The natives lie and steal, but not more than the Japanese. They are cleaner than the Chinese, and have better dispositions than either. I think the foreigners on the concession, without exception, preferred the Koreans, as a race, to either the Chinese or Japanese; and many of us have good friends among the natives. The Koreans are not as progressive or as ambitious as either the Japs or Chinamen, but that is because their government has discouraged them. Under our rule at the mines the younger generation show signs of making smart men, and are miners and timbermen, time-keepers, store-keepers, clerks and typewriters, blacksmiths and tool sharpeners, and occupy practically all the subordinate positions. A very large number of them now speak English, because they learn English so much easier than we learn Korean that we do not take the trouble to learn. In one year I taught my surveying assistant to do plain levelling, use a steel tape and plumb bobs with precision, keep the indexes in my note-books, do all my tracing, and was beginning to teach him to calculate latitudes and departures. He also printed my pictures for me. I have expatiated on this subject long enough, but my enthusiasm for the Koreans rather led me on.

I am sorry I was not able to return by way of Europe, and stop at Boston on my way. This was my plan, but I did not have time to carry it out.

If any of my classmates are in the neighborhood of Grass Valley, I hope they will look me up.

—Harry L. Morse writes from Fort Snelling, Minn.:—

I have joined the Twenty-first Regiment of infantry here, and am temporarily in command of my company. We go to San Francisco September 30, into cantonments at the Presidio, and in March or April next go to the Philippines. Merle Weeks, ex-'99 (architect), is first lieutenant here, and we have some good old talks about the 'State.

—Edwin F. Samuels has accepted a position in the Patent Office, Washington, D.C.—Allen Loomis and family have removed from Woodbury, N.J., to Michigan, their native State, where Mr. Loomis is to teach mechanical and marine engineering subjects to the young idea at Ann Arbor University.

1900.

G. EDMOND RUSSELL, *Sec.*, 404 Stewart Avenue, Ithaca, N.Y.

Too late for publication in our last number came an interesting letter from J. H. Batcheller, written from Treadwell City, Alaska. It was in answer to a letter from the writer asking for a detailed description of his work since graduation, and that it may lose nothing in transposition I give it verbatim:—

My dear Russell,——Your letter of the 2d inst. has just reached me to-day. Since you are asking others of the class to do the same, I will try to give you a brief outline of my doings since I left Tech. Just to-night I am feeling temporarily under the weather, so I will have to make it very brief.

My first year out I spent working for the Homestake Mining and Milling Company of Lead City, So. Dak., on the building and operation of a large twelve-hundred-ton tailings plant for cyanide treatment. During the second and third year I was assayer and chemist for the Spearfish Gold Mining Company of Cyanide, So. Dak. The summer of 1903 was spent travelling through Yellowstone Park and to Skaguay and Sitka in Alaska. Six weeks I spent mountain climbing in the Canadian Rockies in British Columbia and Alberta. The fall and winter of 1903 and the spring of 1904

I worked in the mines and assay office of the Bunker Hill and Sullivan Mining and Concentrating Company of Wardner & Kellogg, Idaho.

Just now I expect to spend a couple of months working and studying all the methods of mining and milling here at the Alaska Treadwell-Mexican and United Gold Mining Companies mines.

Best wishes to yourself, and I hope you will keep up the pushing for class news.

—There is an unusually large number of marriages to record this month, and to all the happy and fortunate couples the best wishes of the class are extended. On Wednesday, September 7, Mr. Charles E. Smith (Course I.) was united in marriage to Miss Pearl Mabry, of Cleveland, Ohio. At home after October 1, at 6 Mansion Street, of that city.—At Cambridge, Mass., on Tuesday, September 20, Mr. Percy Rolfe Ziegler and Miss Mabel G. Hale. At home after November 1, at 190 Watchung Avenue, Montclair, N.J.—Mr. John Wesley Brown and Miss Julia Trask Terry were married on August 23 at Galesburg, Ill. They will receive their friends after November 15 at Boston, Mass.—George E. Russell has resigned his position with the American Car and Foundry Company of New York to take up teaching. This year he will be instructor in civil engineering at Cornell University, Ithaca, N.Y. He will pursue special studies in hydraulic and sanitary engineering.

1901.

E. B. BELCHER, *Sec.*, Malden, Mass.

1901 has been pursuing a very aggressive campaign in the interest of the Tech Fund, and, judging by the results obtained up to the present time, its committee has reason to be very proud of their efforts. 1901 was first in the field with a class committee, and the resolutions adopted June 30 were included in the first general announcement of the Tech Fund Committee. Every member of the class will be approached until he has responded in one way or another, and personal appeals will be made in all possible cases. We want every man to feel that he must have some part, however

small, in this vital question. The committee to date consists of E. F. Lawrence, chairman; L. P. Wood, clerk; Frederick H. Bond, Jr., Matthew C. Brush, Charles F. F. Campbell, F. W. Freeman, H. E. Hildreth, W. G. Holford, R. S. Littlefield, R. S. Loring, J. T. Scully, R. H. Stearns, Ralph Whitman, E. B. Belcher.—L. W. Horne, Bureau of Construction and Repair, Washington, D.C., has been in Boston on a month's leave of absence.—C. J. Bacon will be in New York all winter in the interests of the Star Brass Manufacturing Company.—Married, June 21, Walter M. Curtis to Miss Grace Marian Keene, of East Whitman, Mass.—Married, September 6, L. E. Daloz to Miss Elsa Sammet, at Jamaica Plain, Mass.—A. C. Jewett writes from Orono, Me., that he has become a class father.—W. J. Sweetser has returned to Sackville, N.S., where he is professor at Mt. Allison University.—Married, August 23, William Sayward to Miss Clara Louise Purple, at Woodstock, Vt.—R. S. Loring is to be congratulated on securing a government position in the West.—W. G. Holford has moved to Guy Lowell's New York office.—Harper's friends will be glad to hear of his improved condition from his recent attack of typhoid fever.—It seemed good to see Seaver about the old stamping ground again the first of September. He left for Pittsburg the 17th.—The class is to be congratulated on its representation on the Income Fund Committee. L. P. Wood is secretary, and is doing much for the cause of Tech's welfare.

1902.

CHARLES W. KELLOGG, JR., *Sec.*, in care of Edison Electric Illuminating Co., Brockton, Mass.

Locket is now with the Hawley Down Draft Furnace Company, corner Townsend and Superior Streets, Chicago, Ill. His home address is still 5116 Madison Avenue.—Ballard has been made assistant superintendent of the Griswoldville Manufacturing Company of Griswoldville, Mass.—Gannett is assistant engineer in the Board of Public Works of Harrisburg, Pa. Address, 1427 North Front Street.—Grant is sub-inspector in the United States

Naval Coal Depot at Bradford, R.I.—Kellogg is now with the Edison Electric Illuminating Company of Brockton, Mass.—Mendenhall is with the Minneapolis General Electric Company of Minneapolis, Minn.—Miss Rathbun is at Morenci, Ariz.—Root is now a publisher at 200 Greene Street, New York, N.Y.—Sears has returned to Boston, and is a draughtsman in the motive power department of the Boston & Maine Railroad.—C. H. Sisson's address is now 1440 Benton Street, Alameda, Cal.—Sprague is with the steam turbine department of the General Electric Company, Schenectady, N.Y.—Taft has become assistant in the Mechanical Engineering Department at the Institute.—Wellman is an illustrator, 52 Morningside Avenue, New York City.—Farmer is now assistant to the roadmaster of the Nashua & Portland Division of the Boston & Maine Railroad, with headquarters at Nashua, N.H.—Seabury was married on September 6, in Providence, to Margaret Howard Knight, of that city.—Mr. and Mrs. Lombard were blessed on August 4 by the arrival of a baby girl, called Marie Lombard. Reported, when she was four days old, that she was a little beauty, and resembled her mother. Up to the latest advices the class boy has yet to arrive.

1903.

W. H. ADAMS, *Sec.*, 22 Dix Street, Winchester, Mass.

On August 10 R. J. King (III.) was married to Miss Marjorie Marion Letson, of Medford, Mass.—During the summer the engagements of Aldrich (II.) to Miss Belle Greenough, of Dorchester, and of W. H. Adams (II.) to Miss A. Marguerite Horne, of Malden, Mass., have been announced.—The system of local secretaries which was mentioned in the annual report will be started as soon as the secretary and assistant secretary get settled down to work this fall. It is hoped that it will keep all members of the class more interested in the organization, and help them to keep in better touch with the Institute than can be done by general circular letters.—F. W. Davis (I.) has been appointed chairman of the class committee which is to co-operate with the Fund Committee. At

the present time he is the entire committee in addition to being its chairman. Will every man who has not placed his name on the class roll do so soon? The secretary has requests coming at all times for information. A great deal of this he is unable to supply, as the fellows have ignored all the letters sent to them.

The following list will give the location of fellows whose names were not given in the April number of the REVIEW: W. W. Burnham is now hydrographic aid, Division of Hydro-economics, United States Geological Survey, and is stationed at Fallon, Nev.—C. S. Aldrich is assistant in the Mechanical Engineering Department at the Institute.—R. Livermore (III.) is assistant engineer at Camp Bird Mine, Camp Bird, Col.—A. S. Martin, Chapman Valve Manufacturing Company, Indian Orchard, Mass.—W. C. Martin, instructor, Agricultural and Mechanical College of Texas, College Station, Tex.—G. M. Macdonald (II.) is superintendent of a cartridge factory in Canada.—R. J. MacGregor (VI.), spool business, South Lincoln, Me.—C. W. McCornack (I.), Phœnixville Bridge Company, Phoenixville, Pa.—W. R. McCornack (IV.), Experimental Committee of Museum of Fine Arts, Boston.—J. C. McKenna (II.), professor of mathematics, St. Francis Xavier College, Antigonish, N.S.—J. A. Mears (VI.), assistant superintendent, Consolidated Car Heating Company, Albany, N.Y.—H. C. Merrill (X.), leather factory, Peabody, Mass.—W. H. H. Moies, reporter, Central Falls, R.I.—H. S. Morse (I.), reclamation work, United States Geological Survey, Newlon, Mont.—C. B. Moseley, manufacturer of knit goods, Needham, Mass.—C. P. Mulherin (I.), assistant engineer, Ferro-Concrete Construction Company, Cincinnati, Ohio.—C. P. Nibecker (XI.), Birmingham Water Works, Birmingham, Ala.—R. H. Nutter (II.), Stanley Works, New Britain, Conn.—W. A. Paine, architectural draughtsman, Brookline, Mass.—V. M. Palmer (II.), assistant to superintendent of auto department of the Pope Company, Hartford, Conn.—P. R. Parker (XIII.), Bath Iron Works, Bath, Me.—J. F. Pell, last manufacturer, Newark, N.J.—A. L. Place, civil engineer with United States Geological Survey, Washington, D.C.—S. G. Porter, engineering aid, United States Geological Survey, Roswell, N.M.—H. B. Pulsifer (V.), instruc-

tor, New Hampshire State College, Durham, N.H.—H. E. Raymond (II.), mechanical engineer with Missquoit Pulp Company, Sheldon Springs, Vt.—J. W. Regan (II.), student, graduate school at Harvard.—A. P. Rice (I.), Massachusetts Highway Commission, Boston.—E. F. Ricker (IV.), with E. Ricker, Son & Co., Quincy, Mass.—C. H. Roberts, with Gilbert & Barker Manufacturing Company, Boston.—W. T. Robertson, paper manufacturer, Hinsdale, N.H.—J. A. Robinson, plantation manager, La Atalaya Plantation Co., Nueritas, Cuba.—E. J. Ruxton (II.), assistant in mechanical engineering, M. I. T.—O. P. Scudder (XIII.), with Boston Elevated Railroad, Boston.—T. E. Sears (II.), inspector, Chicago Underwriters' Association, Chicago, Ill.—G. B. Seyms (II.), experimental department, J. H. Case Threshing Machine Company, Racine, Wis.—G. B. Sibbett (II.), salesman, J. K. Vandyck Company, Philadelphia, Pa.—C. J. Smith, New England Telephone and Telegraph Company, Boston.—J. M. Smith, Pennsylvania Railroad, Altoona, Pa.—H. D. Strong, Farbenfabriken of Elberfeld Company, New York.—W. E. Sumner (X.), F. W. Bird & Son, paper manufacturers, Walpole, Mass.—G. W. Swett (II.), assistant in mechanical engineering at the Institute.—A. R. Taft, builders' hardware, Boston, Mass.—F. T. Taylor (VI.), General Electric Company (West Lynn Works.)—L. H. Underwood (III.), assistant blast furnace manager, National Tube Company, Wheeling, W. Va.—L. Wehner (XIII.), draughtsman, the Bucyrus Company, South Milwaukee, Wis.—W. H. Whitcomb (V.), assistant in chemistry, M. I. T.—W. Whitehead, manufacturing textile chemicals, Medford, Mass.—H. T. Winchester (VI.), Stone & Webster, Boston, Mass.—G. B. Wood (II.), assistant to vice-president, Westmoreland Coal Company, Philadelphia, Pa.—M. Wortham, superintendent, Lucy Furnace, Carnegie Steel Company, Pittsburgh, Pa.

1904.

ARTHUR W. BARTLETT, *Sec.*, 41 Monroe St., Newburyport, Mass.

Every member of the class will be deeply affected to learn of the death of John Arthur Fremmer at Lawrence, Mass., in August. The class and Institute alike suffer a serious loss.—A colony of 1904 men have gathered about Pittsburg, Pa., and vicinity. W. H. Eager, J. R. Sanborn, D. L. Galusha, Currier Lang, R. Hazeltine, and W. E. Hadley are located there.—The graduate organization of the class has begun in earnest. The ballots for secretary and assistant have been sent out already. It is to be remembered that all men who have attended the Institute for one school year as a member of 1904 are eligible to membership, and may become members upon making known their desire to the secretary.

NECROLOGY

JEROME SONDERICKER



During the summer vacation the Institute has suffered the loss by death of Professor Jerome Sondericker. He was born in Woodstock, Ill., Dec. 21, 1859, and died at his summer cottage in Wilmington, Vt., July 22, 1904, of uræmic toxæmia.

He was educated at the University of Illinois, where he received the degree of S.B. in 1880, with the highest record ever attained up to that time; and in 1883 he received the degree of C.E. (civil engineer). He was

employed for five years on the instructing staff of the university, first as instructor, and subsequently as assistant professor of engineering and mathematics, besides having been engaged in some engineering work outside.

In September, 1885, he came to Boston to assume the duties of instructor in applied mechanics at the Massachusetts Institute of Technology, becoming assistant professor in 1890, and associate professor of applied mechanics in September, 1899, which position he held at the time of his death.

In 1889 he married Miss Ellen M. Carman, of Ohio, who survives him.

He was a teacher of very great ability, and was very much beloved and respected by his students, for whose sake he was always ready to exert himself in any way that would be conducive to their advancement.

Besides his class-room work, he conducted the work of the laboratory of applied mechanics for several years, and, partly at that time, and partly subsequently, he made a number of valuable investigations, the greater portion of which were concerned with the testing of cement and with the effect of repeated and alternate stresses upon the resisting properties of iron and steel, besides others upon subjects connected with the strength of materials.

Among his publications are the following:—

1. An Investigation as to how to test the Strength of Cements. Published in the *Transactions of the American Society of Mechanical Engineers* in November, 1887; in the *Technology Quarterly* in December, 1887: and in the *Journal of the Association of Engineering Societies*, in June, 1888.

2. Experiments Relating to the Theory of Beams. Published in the *Technology Quarterly* in October, 1888.

3. A Description of Some Repeated Stress Experiments. Published in the *Technology Quarterly* in April, 1892.

4. Comparative Tests of Different Forms of Cement Briquettes. Published in the *Journal of the Association of Engineering Societies* in January, 1899, and in the *Engineering Record* in December, 1899.

5. Repeated Stress. Published in the *Technology Quarterly* in March, 1899.

6. A Treatise on Graphical Statics. Published by John Wiley & Sons, New York.

His treatise on Graphical Statics is an excellent one, and presents the subject in a very clear, able, and modern way.

His profound knowledge, his great ability as a teacher, his kindness, as well as his gentlemanliness, and his sterling character endeared him to the large number of students that have passed through his hands, to his colleagues on the teaching force, and to all who knew him.

GAETANO LANZA.

KILBURN SMITH SWEET

It is safe to say that to no one who has been connected with the Civil Engineering Department of the Institute of Technology in

recent years, either as teacher or as student, will the thought of the recent death of Mr. Kilburn Smith Sweet fail to bring kindly remembrances of personal intercourse with him and sincere regrets for his loss. To those who often know in part, but seldom can know fully, the difficulties under which many young men have labored who come to the Institute for their education, the life of this man must seem typical and full of interest.

He was born in Ramsey, Minn., Feb. 25, 1872. His father, Captain Thomas M. Sweet, served through the Civil War in the Twenty-fourth Regiment, Massachusetts Volunteers. In 1867 he went West, and took up farming, hoping to regain his health, which had been ruined by four years of army life. He was obliged to give up after a few years, and, returning East, died at Edgartown, Mass., in 1873. His wife, Laura Allen Kendrick, was born in Bangor, Me., and died at Edgartown in 1875, leaving four sons, of whom Kilburn was the youngest.

Left an orphan at three years of age, with a constitution far from robust, Mr. Sweet's life was full of evidence of the generous faithfulness of friends. His resources at the outset consisted mainly of a small pension and his proportionate share of a fund subscribed by the officers of his father's regiment for the family of their comrade.

Until about ten years of age he was in the care of a relative of his mother, during which time he attended school first in Jamaica Plain and later the Rice Primary School in Boston. A part of one year was then spent at a boys' boarding school in Boston, from which, in delicate health, he went to live with another relative, Mrs. Pamelia A. Case, in Kenduskeag, Me., and remained with her, visiting one year in Kansas City, until he was seventeen. To the motherly care and faithful Christian training of this devout woman, during those important years, he owed very much. He attended the village high school at Kenduskeag, doing his work with a thoroughness that soon brought its reward, and was graduated early in 1889.

In April of that year he came to Boston to attend the Bryant & Stratton Business College. While waiting for school to open in

the fall, he was employed for a short time as errand-boy in the office of the Institute of Technology. He attracted the attention of one of the officers of its Corporation, who encouraged him to take its entrance examinations, and assisted him to prepare in the few days that remained before they were given. He passed the examinations in all subjects except French, which he had never studied; and his new-found friend personally assisted him to make up this deficiency during his Freshman year. His expenses during the course at the Institute were met by his own summer earnings, by scholarship funds, and by the contributions of friends.

On coming to Boston to live, the young man found a homelike boarding-place among relatives, one of whom was for years his room-mate and a wise counsellor. He attended church regularly at Berkeley Temple, and before long became a member. He entered heartily into the social and religious life among the young people, finding in the society of Christian Endeavor, of which he became president, a fine opportunity for the unfolding and strengthening of his character and the perfecting of the gentle courtesy of manner which made him a man one liked to meet. Here he made the acquaintance of Miss Jessie Louise Johnson, who was destined to become his wife. They were married in September, 1900, and settled in Allston, entering at once earnestly into the work and worship of the Allston Congregational Church.

Mr. Sweet was graduated from the Institute in the course in civil engineering in 1893, and returned in the fall of that year as Assistant. Later he became instructor in civil engineering, which position he held down to the time of his death, his duties being mainly in connection with the work in hydraulics, stereotomy, and surveying. Few summers, if any, passed in this period without his devoting the vacation season to practical engineering work. He was thus employed on surveys, investigations, or construction for the city of Newton, the towns of Winchester and Hopedale, the Associated Factory Mutual Insurance Companies, the Massachusetts Water and Sewerage Board, the Committee on Additional Water Supply for the City of New York, and the United States Geological Survey. Shortly after the Technology Reunion he began summer

work for Mr. Leonard Metcalf, of this city, but increasing trouble from a physical infirmity which for years had beset him, and against which he had fought perseveringly and patiently, soon compelled him to rest. Within a couple of weeks thereafter it suddenly became acute, and early on July 15 he passed away, apparently without pain or premonition that the end was near. The immediate cause of his death was pronounced to be acute congestion of the brain.

He was a man of sterling character. Sympathetic and ever helpful to others, quiet and gentle, yet courageous in a high degree, clear in thought and efficient in action, he merited and has won an enduring place in the admiration and love of his many friends.

DWIGHT PORTER.

BOOK REVIEWS

THREE UNDERGRADUATE PUBLICATIONS

"THE INSTITUTE"

As a new-comer among student publications, the *Institute* has first claim upon the notice of the REVIEW. It is to be a monthly publication, and owes its existence to the fact that the *Tech*, which started as a bi-weekly and which afterwards became a weekly, has this year evolved into a news sheet appearing three times a week. The *Institute* is, therefore, a sort of expansion of the editorial pages and of the literary features of the *Tech*, carried on, however, by a separate board of publication. The first number, which appeared on the opening day of the college, is arrayed in a tasteful cover of deep blue, and is typographically handsome and effective. Editorially, it deals with those questions which relate to the Institute as a whole rather than with matters affecting solely the undergraduate body, and handles those topics with warmth and yet with dignity. The account of past torchlight parades is interesting, the "Episode," since it is to be continued, asks for a suspension of judgment, and the résumé of current scientific news is sufficiently well done. Should the *Institute* maintain the promise of its first issue, it will achieve the high standard which the student publications of the Institute have established, and ought to meet with the hearty support of the student body.

"THE TECH"

As already stated, the *Tech* has definitely elected the rôle of a daily newspaper (appearing, however, every other day), and is now to be judged by new canons,—those of the purveyor of current college information. Of necessity, therefore, it has dropped very largely the quality of interest to assume that of pure utility. In other words, that portion of its four pages which is not given to

advertisements must necessarily present the appearance of an amplified bulletin board. The success of the paper will depend upon the completeness and accuracy of the news chronicled and upon the skilful brevity with which that news is set forth. As a means of training those undergraduates who are upon the *Tech* board in the important work of gathering and presenting the daily life of the Institute undergraduates, the new *Tech* cannot fail to be of great service. And, if their work is done well,—as the numbers thus far issued give good promise of its being performed,—the *Tech* will make itself an essential part of every student's equipment.

“TECHNIQUE,” 1905

Although very late in the year to make reference to *Technique*, the Reunion and other absorbing Institute affairs have precluded an earlier mention of this always satisfactory product of the zeal and industry of the Junior Class. The successive *Techniques* are so uniformly good, and cover so nearly the same ground, that it is difficult to find distinctive adjectives of commendation for each annual issue. This one, very properly, is dedicated to Mr. Samuel Cabot, a member of the Corporation who has done much for the promotion of athletics; and a beautiful illuminated page serves as introduction to an interesting, useful, and humorous medley of fact, of fancy, and of that which lies on the borderland of both,—statistics.